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2nd EDITION

VETERINARY TOXICOLOGY

R. J. Garner, M.A., M.V.Sc., F.R.C.V.S., A.R.I.C.

Head of Public Health Section, Radiological Protection Division, Authority Health and Safety Branch, U.K.A.E.A., Harwell, Berks.; formerly Head of Radiobiology Department, Agricultural Research Council, Field Station, Compton, Berks.; formerly Senior Lecturer in Chemical Pathology (Veterinary), University of Bristol.

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Malignant Catarrh of Deer

BY

R. A. HUCK, A. SHAND, P. J. ALLSOP and A. B. PATERSON

Central Veterinary Laboratory, Weybridge

SUMMARY.—A disease that occurred among Père David's deer (Elaphurus davidianus) *at Whipsnade Zoological Park was transmitted to red deer, to calves and to rabbits. The clinical symptoms,* post-mortem *and histological findings, and experimental inoculations indicated that the disease was malignant catarrh.*

Introduction

BEFORE discussing the features of the disease, a note on the history and anatomy of the species is appropriate, because it is a unique animal in type and in its survival.

Specimens obtained during excavations and dated up to 1766 B.C., show that the species must have ranged over a large area when wild, extending from the Huang-ho valley in the north, to the Yangtze and Ch'ien-t'ang valleys in the south of China (Jones, 1951). No other record of the existence of the species is available until 1865, when Père David, an adventurous French doctor and traveller, saw the deer over the wall of the Imperial Hunting Park near Peking. In 1894, floods breached the wall of the Hunting Park, and many deer escaped "to be devoured by the famine stricken peasantry" (Bushell, 1898). Some survivors, said to have been kept in a temple in the Park, were slaughtered by Allied troops during the Boxer Risings in 1900. No further information is available from China until 1917, when a pair, the presumed survivors of 1900, were placed in the zoo of Peking. By 1921, the species was extinct in China.

During the latter part of the nineteenth century, specimens were obtained for Zoological societies in Europe. About the beginning of the twentieth century, the Zoological Society of London together with the Eleventh Duke of Bedford collected together the Père David's deer surviving in Europe. The numbers have been built up from about 18 in 1900, to a world total of 443 in 1957, of which 324 were in Woburn Park (Tong, 1957). To ensure the survival of the species, deer were distributed throughout the world. In 1955, four deer were sent to Peking Zoological gardens, where they have bred and so have become re-established in their country of origin.

Anatomically, Père David's deer belongs to the Old World section of Cervidae. The Chinese called it Mi-Lou or Ssu-pu-hsiang, the Four Unlikes, as it was considered to have antlers like a reindeer stag, the neck of a camel, the feet of a cow and the tail of an ass, thus suggesting it was not aesthetically attractive. The antlers of the males distinguish it from Cervus in that the brow tine dominates the formation; there are no forward pointing tines. The species is relatively large, midscapular heights of males being about 48 inches and females 45 inches.

The Natural Outbreak of Disease

The natural outbreak of the disease began in April and continued until July, 1959, in a small herd of about 14 Père David's deer. The herd originated from the Woburn Park stock and had been kept in one small paddock in Whipsnade Park for about 13 years. A few additions were made from time to time, the last being a female put into the paddock in 1955. Some inbreeding occurred in the small herd.

The first death occurred in the third week of April, followed by a second 6 weeks later. Succeeding deaths occurred at 3½, 7 and 11 days after each other. In all 7 animals died and 1 was killed. Five deer had succumbed by July 5th. The sixth deer to be affected was received at the laboratory on July 8th, and was killed after being observed for 2 days. A further 2 were received for *post-mortem* examination later in the month. As the incidence of the disease appeared to be increasing, it was decided to slaughter the remainder of the herd to prevent possible spread to other Artiodactyla in the Park.

The findings in the natural disease were similar to the findings of the experimental disease in red deer, therefore a description of the experimental

TABLE I
TRANSMISSIONS OF DISEASE IN RED DEER

Red Deer Passage	Inoculum: Origin tissues obtained at *post-mortem*	Inoculum: Route and tissue	Animal inoculated	Inculation period days	Results
First	Père David's Deer 6	I/V 20 ml. blood I/N 5 ml. tracheal and nasal mm., lung	Red Deer 1	23	Died 24 days
Second	Red Deer 1	I/V 40 ml. blood I/N 5 ml. tracheal mm., lung, lymph node	Red Deer 2	23	Killed 26 days
Third	Red Deer 2	I/V 40 ml. blood I/N 5 ml. tracheal and oral mm., small intestine	Red Deer 3	19	Killed 24 days
Fourth	Red Deer 3	I/V 20 ml. blood I/N 5 ml. tracheal of turbinate mm., lung, hard palate, abomasum, rectum, anus, spleen, liver, kidney, brain	Red Deer 4	18	Killed 22 days
Fifth	Red Deer 4	I/V 20 ml. blood I/N 5 ml. tracheal and oral mm.	Red Deet 5	18	Killed 19 days
Sixth	Red Deer 5	I/V 20 ml. blood I/N 5 ml. tracheal and oral mucosae and intestine, lung	Red Deer 7	26	Killed 38 days
Seventh	Red Deer 7	I/V 20 ml. blood I/N 5 ml. tracheal and oral mucosae, spleen and liver	Red Deer 6	20	Died 23 days
Eighth	Red Deer 6	I/V and I/N clotted blood, ground with spleen, liver, brain, lymph node, intestine, lung	Red Deer 8	48	Killed 61 days

I/V = intravenous. I/N = intranasal.

TABLE II
TRANSMISSION IN CALVES

Calf passage	Inoculum: Origin	Inoculum: Route and tissue	Animal inoculated	Inculation Period days	Result
First	Père David's deer 6, tissues obtained at *post mortem*	I/V 10 ml. blood I/N lung, tracheal and nasal mm.	C.1478	31	Mild disease
			C.1483	31	Severe disease killed 50 days
Second	Calf C.1483 bled 26 days after inoculation	I/V 40 ml. blood	C.1537	26	Severe disease killed 36 days
			C.1538	26	Severe disease killed 27 days

TABLE III
ATTEMPTS TO ESTABLISH INFECTION IN CALVES FROM DEER

Attempt	Origin of inoculum	Calf number	
First	Père David's Deer 6 I/V blood I/N lung, tracheal and nasal mm.	C. 1478	Mild disease
		C. 1483	Generalised disease
Second	Red Deer 2 I/V 40 ml. blood I/N 5 ml. tracheal oral and small intestine mm.	C. 1516	Mild disease
		C. 1524	Mild disease
Third	Red Deer 7 I/V 50 ml. blood I/N 5 ml. tracheal and oral mm., spleen and liver	C. 1544	No reaction
		C. 1545	No reaction

disease in that species covers the clinical and *post-mortem* findings in the natural cases.

Transmission Experiments

(A) Materials and Methods

1. *Large Animals*

Blood and tissues were obtained from clinically sick animals at the time of *post-mortem* examination. Red deer, calves and sheep were bled into a citrate solution (final concentration of sodium citrate 3 mg. per ml.) and the blood stored at +4° C. until required for inoculation. In general, tissues showing macroscopic changes were obtained and duplicate samples stored at +4° C. and −20° C. Approximate 10 per cent. suspensions of tissues were prepared in phosphate buffered saline or peptone broth for transmission experiments.

Transmission experiments were carried out by the intravenous inoculation of whole blood, and additionally in red deer and some calves, sheep and goats, by intranasal instillation of a tissue suspension. The details are given in Tables I to IV. For serial transfer of the disease, only tissues stored at +4° C. were used.

2. *Rabbits*

The inocula used to try to establish infection in rabbits were the same as those used for the current serial transfer of the disease in red deer. They were inoculated by one or several methods using intraperitoneal, intravenous, intranasal and intracerebral routes. Serial transfer in rabbits was carried out by the intraperitoneal inoculation of 5 ml. of an approximate 10 per cent. suspension of kidneys,

TABLE IV
PROPERTIES OF THE AGENT

Animal	First inoculation	Result	Second inoculation	Result
Red Deer 6	Blood and tissues of Red Deer 2 as for 3rd red deer passage. Stored 52 days at +4° C. and −20° C.	No reaction	Blood and tissues of Red Deer 7 as for 7th red deer passage	Reacted, died 23 days
Red Deer 8	450 μ A.P.D. Gradocol Membrane Filtrate of tissues of Red Deer 5 as for 6th red deer passage	No reaction	Blood and Tissues of Red Deer 6 as for 8th red deer passage	Reacted killed 61 days

Red deer passage refers to Table I.

livers, spleens, lungs and brains of rabbits from the previous passage.

3. *Other Small Animals and Embryonated Eggs*

Guinea-pigs, mature and unweaned white mice were inoculated in the same ways as rabbits, using similar inocula. The attempts to establish disease in these species failed.

Embryonated hen eggs, incubated for 6, 10 and 12 days, were inoculated respectively by the yolk sac, chorioallantoic and intravenous routes and showed no changes.

4. *Tissue Cultures*

Monolayer cultures of calf and pig kidneys were prepared by the trypsinisation method of Dulbecco and Vogt (1954) modified by Youngner (1954). 0.1 ml. of infective tissue suspensions from infected red deer and rabbits was inoculated on to each of 10 test-tube cultures per tissue. Similarly, monolayer cultures of kidneys, livers, spleens and lungs of infected red deer and rabbits were made. One of 3 attempts to culture red deer tissues was successful. In addition, fragment cultures of infected red deer and rabbits, using the same organs as for the monolayers, were grown in plasma clots.

The cultures were observed for 28 days; all the culture fluids were then passaged to established pig and calf kidney monolayers and observed for a further 28 days. No cytopathic changes were recorded in any of the cultures.

(B) Results

1. *Red Deer*

In all, 8 serial transfers were made as shown in Table I. Tissues from the sixth Père David's deer in the natural outbreak being used to start the series.

(a) *Clinical findings.* The incubation period varied from 18 to 48 days and the onset of disease was sudden. The first indication of illness was usually dullness with general malaise and loss of will or ability to resist handling. Owing to difficulties of restraint the deer were not handled until this stage. A mucopurulent conjunctivitis with nasal discharge was present, frequently with excess salivation. The track of the dribbling saliva rapidly became depilated leaving a very raw surface, especially under the lower lip. One case showed opacity of the cornea with impaired vision. The outstanding characteristic of the condition was the rapid progress of the disease, the deer becoming recumbent and very sick within about 24 hours of first being noticed ill. Bodily condition was lost rapidly and the animals became very docile. Ulceration of the lips and muzzle was observed with an intense congestion of the surface and to this a yellow grey purulent material was adherent. Stertorous breathing occurred, presumably due to inflammation of the nasal mucosa and accumulated debris resulting in the restricted passage of air. On examination of the perianal area, discrete ulcers were noted in 6 deer. In some of these there was an accompanying rawness of the area with extension of lesions to the vulva and vagina. Circumscribed skin lesions distributed about the head occurred in 4, and also on the back and legs of one of these. Frequent dribbling of urine was noted, small quantities being voided at intervals of 2 to 3 minutes over periods of up to half an hour. Plates I, II and IV illustrate some of the characteristics of the clinical disease.

In all the animals, the ears drooped and tended to lie backwards, giving the deer a very dejected appearance. Also in several, whilst standing, there was a tendency to cross the hind legs; this was done frequently, the posture being maintained for several minutes. At this time, the temperature was invariably elevated to about 105° to 106° F., and remained high during the course of the illness in all deer except Red Deer 7 in which it returned to the normal range after 5 days.

Examination of the oral cavity showed lesions varying from discrete ulceration to diffuse intense inflammation affecting all areas, especially the hard palate. Frequently a greyish white mucopurulent deposit was present over the whole surface. No lesions were observed on the feet.

Red Deer 7 was ill for 12 days before *post-mortem* examination. The temperature ranged from 106.6° to 103.4° F. for 5 days from the beginning of clinical disease. On the sixth day of illness, the temperature was 102.8° F., and clinical signs were still marked, except that the ocular discharge was watery and reduced in amount. The nostrils and muzzle had become clear of debris and were raw; the perianal and vulvar lesions appeared to be healing. The animal looked brighter than previously, and was eating a little. Improvement continued and on the seventh day the rawness of the muzzle was resolved, leaving a clean, pink, flesh-coloured surface, completely devoid of pigment. On the 9th day, pigmentation began to reappear below the

junction of the top of the muzzle with the skin of the nose, manifest as a "blueness." This area of pigmentation rapidly increased downwards until it covered half the muzzle in 3 days and at this stage, the deer was almost back to normal health.

(b) Post-mortem *findings*. Macroscopically the main change was a generalised affection of the epithelial surfaces, mainly of the digestive and respiratory tracts. Eight red deer reacted, and all but 2 were examined *post mortem* after 1 to 4 days of clinical signs; the seventh had been ill 12 days and the eighth 13 days when killed. Generally, the oral cavity was acutely inflamed with dirty purulent material adherent over the surfaces. Intense reddening of the gums around the bases of the teeth was noted in two. In one, the tongue was covered completely with a greyish white mucopurulent material. Frequently, the buccal mucosa at the junction of the lips was denuded of epithelium with loss of papillae in the area. The ulceration of the hard palate extended from the dental pad to the fauces, affecting in the main the summits of the rugae. The generalised inflamed appearance extended into the pharyngeal cavity, in some also into the larynx. Red Deer 7 and 8 were apparently recovering when killed and showed large areas where the epithelium was regenerating, especially on the muzzle and hard palate.

No lesions were noted in the oesophagus. In the rumen, denudation with a general dry necrotic appearance of the epithelium and loss of papillae occurred. This involved the oesophageal groove in one case, and extended to the omasal epithelium, where the folds were thickened and oedematous. The abomasum and intestines were usually empty of ingesta, but catarrhal changes of the mucous membrane were associated with a lot of fluid. The abomasum was involved in all cases and a typical example is illustrated in Plate III. The lesions varied from a widespread intense haemorrhagic appearance of the lining, the discrete haemorrhages associated with ulceration of the intestines. The distribution of the lesions also varied; some showed changes throughout the small intestine, in others the changes were localised in the ileum. Part or the whole of the caecum and large intestine was involved. Haemorrhagic striping of the caecum, large intestine and rectum was noted in some cases.

There was involvement of the upper respiratory tract in 4 cases, intense reddening with discrete haemorrhagic areas extending throughout the length of the trachea, and involving the larynx in some. Erosion of the mucous membrane occurred, which was usually covered by heavy mucous exudates. The internal iliac, submandibular and the superficial lymph nodes were enlarged and appeared haemorrhagic in 4 deer; perinodal oedema occurred. The haemolymph nodes were usually very obvious. The livers of 3 showed greyish subcapsular foci which extended into the depth for a few mm.; 2 also had adhesions to the diaphragm.

Discrete necrotic skin lesions were noted in four, and necrotic perianal lesions in six deer with extensions of the lesions to the vulva and vagina. The deer killed after twelve days of disease had shown perianal lesions but these had regressed by the time of *post mortem*. In some, there appeared to be excessive cerebro-spinal fluid, with congestion of the meningeal vessels.

2. *Calves*

Two serial transfers were made in calves. The details are given in Table II. A further attempt to transmit the disease in calves was not successful. In this case the animals were being used as controls to an experiment designed to define some of the properties of the causal agent. Citrated whole blood was not included in the inoculum; however, cellular material was included, and this is known to transmit malignant catarrh.

Further attempts to establish the disease in calves were made from Red Deer 2 and 7 (Table III). In the former case, mild disease followed, and in the latter case, no reaction occurred. The 2 types of clinical reaction will now be described separately.

(a) *Clinical Findings*

(i) *Severe acute disease*. The incubation period varied from 26 to 40 days, and was characterised by a rise in temperature. The clinical signs were the same as those described for the Red Deer, with the addition of joint involvement, and more severe affection of the eyes. Within 2 to 3 days of the initial temperature rise, the affected calves developed a stiff gait and adopted a "chronic laminitis" posture on standing. Many joints of the limbs were found to be hot and swollen, the fetlock joints were all affected, together with some or most of the knee, hock and stifle joints. The animals were soon recumbent. On examination, the coronary band showed intense reddening, and was hot and painful when handled. Extensive necrosis of the skin between the claws was evident, either as discrete or diffuse ulceration. Plate V illustrates the appearance of the head of a calf after one day of illness.

(ii) *Mild disease*. This was observed in 5 calves, one of the first serial passage, in 2 when a further attempt to establish the disease in calves from red deer was made, and finally in 2 calves which were put into contact with an acutely ill calf.

The incubation period varied from 20 to 31 days after inoculation. The systemic upset was very slight. One calf showed a temperature of 105.1° F. which persisted a few hours, 19 days after inoculation. The most obvious feature was the ulceration of the hard palate, and only in one was there apparent spread of ulceration to other parts of the buccal cavity. The mouth lesions were accompanied in 2 by enlargement of the suprascapular and precrural lymph nodes. The ulceration appeared to regress over a period of 3 to 4 days following its first appearance, and in one no lesions were visible after 4 days. However, in all, an exacerbated disease occurred after a further 2 to 3 days manifest by extensive ulceration of the whole of the hard palate. The ulceration was present for 11 to 16 days, followed by healing. All cases had normal

mouths from 45 to 52 days after exposure to infection.

The striking clinical feature of this type of reaction was that the animals remained apparently normal during the time the mouth lesions were present. They ate well and maintained good bodily condition. There was no external evidence to suggest the presence of mouth lesions.

(b) Post-mortem *Findings*

Post-mortem findings in the severe cases resembled those in the deer. Plate VI illustrates the lesions of the hard palate. Patchy pneumonia and oedema of the lungs were noted. No perianal lesions were recorded and there were no skin lesions.

The joint affection appeared to be a periarthritis. Coronitis was marked, and in one, sloughing of the horn of the rudimentary digit was apparent. The synovial fluid was clear. The skin between the claws showed ulceration or was easily "broken" indicative of necrotic change of the epithelium.

3. *Rabbits*

Attempts were made to establish infection in rabbits from 6 of the red deer experimentally infected. Of these, one attempt using tissues from Red Deer 4 was successful. This deer had been ill 4 days when killed.

Citrated whole blood together with a suspension of tracheal and oral mucosae from Red Deer 4, was inoculated into pairs of rabbits. Three pairs of rabbits were given cortisone acetate by the intramuscular route at the time of infection and daily for the succeeding two days; 25 mg. of cortisone acetate was given at each injection. One pair was given the infective inoculum intravenously, another intraperitoneally, the third pair orally and also by scarification of the skin. No reactions followed. Of a fourth pair of rabbits inoculated intravenously with deer tissues, and with supplementary intraperitoneal inoculations of normal citrated calf blood for 3 days, one showed nasal and ocular discharges 50 days later. It was ill for 3 days before it died, and serial transfers were begun from this rabbit. Eight serial transfers have since been made (Table VI).

Clinical findings. Clinical reactions or death without signs occurred in 49 (94.2 per cent.) of 52 rabbits inoculated. In 38 rabbits (73.1 per cent.), nasal and ocular discharges were first seen. A few of these were watery at the beginning, but most were obvious as mucopurulent discharges. The ocular discharge was frequently a yellow bead of mucopurulent material lodged in the inner canthus of the eye. In some this was accompanied by drainage over the face showing wetness of the fur below the inner canthus. Nervous disorder occurred in 5 (9.6 per cent.). One showed an altered gait, the method of progression being changed from a hopping to a walking movement. Two were paraplegic, and 3 held their heads backwards with the noses pointing upwards. In addition 4 rabbits had diarrhoea. Three rabbits showed only inappetence and dullness, 2 showed no clinical signs but were found dead. From Table VI it will be seen that the duration of illness was relatively short in most cases. Thirty-two rabbits died, 2 were sudden deaths without premonitory signs, 23 (71.8 per cent.) were ill from 1 to 3 days, 2 (6.2 per cent.) from 4 to 6 days, 3 (9.3 per cent.) from 7 to 10 days, 1 for 22 and 1 for 34 days.

In one experiment pairs of rabbits were inoculated with suspensions of a single organ intraperitoneally, the control rabbits being inoculated similarly with a pool of these suspensions. It was shown that kidney, liver, spleen, brain and lung suspensions separately transmitted infection. The control rabbits reacted.

Post-mortem findings were variable with no consistent macroscopical changes in the organs or tissues.

4. *Bacteriology*

Bacteriological examinations were carried out on all deer and calves used in the investigation. Cultures, using blood agar and MacConkey plates, were made in air, 10 per cent. CO_2 and under aerobic conditions. Parts of the digestive and respiratory tracts, all organs and brains were cultured. In calves, the affected joints were also cultured. No organisms were recovered from fresh tissues normally sterile, and with 2 exceptions isolations of various organisms were made which were not recognised animal pathogens. *Actinobacillus lignieresi* was recovered from the mouths of 2 deer, but this was not considered to be associated with this disease. One calf remained healthy following administration of this strain of *A. lignieresi* by the intravenous and oral routes.

5. *Histology*

Tissues were fixed in 10 per cent. formol saline and sections stained by haematoxylin and eosin. In all 142 sections were examined from 2 Père David's deer, 7 red deer and 10 rabbits. Sections of the kidneys, livers, and cerebral hemispheres were examined in all species. The cerebellar hemispheres and the medullae were examined in the large animals, together wth parts of the respiratory and digestive tracts where macrosoopic lesions were present.

(a) *Parenchymatous organs.* In general, the changes observed were lymphoid cellular infiltrations around the blood vessels. In the liver, these lesions were found around the portal tracts, together with centrilobular cellular degeneration in some cases. The severity of the lesion was most marked in all the rabbits, the least obvious in one Père David's deer. The change is illustrated in Plate X showing changes in a calf's liver.

The kidney lesions were not marked in 2 red deer and 2 rabbits. The change observed was a lymphoid, cellular infiltration in the cortex principally. In 3 deer, subepithelial infiltration also occurred in the pelvic area.

The changes in the brains were essentially perivascular cuffing by lymphoid cells with focal gliosis in some. The changes were not marked in the 2 Père David's deer or in 2 of the calves which had

severe acute disease. Six rabbits showed marked lesions in the cerebral hemispheres; the remainder showed no changes. The lesions were distributed in all parts of the brains examined in the larger animals. Plate VIII, of Red Deer 7, is typical of the change observed.

(b) *Surface epithelia.* In general, sections of the oral cavities, and digestive tracts were prepared where macroscopic changes were recorded on *post-mortem* examination. Similarly the nasal cavities and respiratory tracts were examined. In general, the lesions noted were subepithelial infiltrations of the mucous membranes with accompanying haemorrhages and ulceration in some. The types of changes are illustrated in Plates VII and IX, showing Red Deer hard palate and calf rumen respectively. The histological lesion was observed without macroscopical change in some cases.

6. *Tissue Cultures*

A pool of tissue culture fluids, harvested after 14 days' growth, from monolayer cultures of organs of Red Deer 7 was tested in rabbits for infectivity. The rabbits were inoculated intraperitoneally. One of 9 rabbits showed a slight nasal discharge and was off its food 38 days later. It was killed after showing signs for 4 days. The significance of this reaction was in doubt as the rabbits were housed in the same room as other infected rabbits used for serial transfer, and further, suspensions of fresh tissues of Red Deer 7 inoculated into rabbits did not cause disease.

Tissue culture fluids, harvested at 8, 11 and 22 days following infection of calf and pig kidney monolayers with a tissue suspension from Red Deer 8, failed to cause disease in rabbits.

7. *Properties of the Agent*

One of the outstanding characteristics of the causal agent of malignant catarrh is the relative ease with which it loses infectivity by physical treatment. In this respect, the agent is very fragile and will not withstand storage at +4° C. for longer than a few days. Tissues of Père David's deer 6, originally infective, failed to cause disease in 2 calves after being stored for 72 days at +4° C. The quantities and routes of inoculation used were the same as those of the first serial passage in calves. A further experiment in calves using frozen and thawed tissues, and filtrates of such tissues failed as the control animals inoculated with untreated material containing cellular debris did not show a reaction. Because of the difficulty of maintaining and establishing infection in calves, 2 Red Deer were then used (Table IV). One deer was inoculated with tissues of Red Deer 2 which were previously shown to be infective. Citrated whole blood stored at +4° C., and a suspension of tracheal and oral mucous membrane and small intestine stored at +4° C. and −20° C. for 52 days caused no reaction. On challenge 58 days later with tissues obtained from Deer 7, the deer reacted and died 23 days after inoculation. The second deer of this pair was inoculated intravenously with a filtrate of a suspension of tracheal and oral mucosa, intestine and lung from Red Deer 5. This deer remained healthy, but subsequently reacted when challenged 63 days after the first inoculation, by intravenous inoculation of whole blood and tissues from Red Deer 5. Thus the indications were that this agent would not store for long periods, and that filtrates were not infective. In view of the difficulty of working with deer, the effect of storage was tested in rabbits. Rabbit tissues stored at +4° C. for 7 days from the third serial passage, caused disease in 4 rabbits. The mean incubation period was 60 days, with a range from 35 to 77 days. One rabbit was found dead, 2 had diarrhoea and 1 of these and the remaining rabbit showed nasal and ocular discharges. The tissues in this experiment retained their infectivity, but caused disease after a prolonged incubation period.

Differential Diagnosis

Mucosal Disease

Richards, Schipper, Eveleth and Shumard (1956) describe mucosal disease in deer and calves. This, together with previous experience of mucosal disease in calves (Huck, 1957) indicate that the symptomatology and incubation periods are different.

Two calves which had previously reacted to mucosal disease infection failed to react when inoculated with tissues from Père David's deer 6. The significance of this is not understood. The calves were about one year of age when infected; 2 cows about 2½ years old also failed to react. The calves showing malignant catarrh were all under 6 months of age. Further evidence that the two conditions are different rests with cross neutralisation tests in tissue cultures using the Oregon C.24 strain of virus diarrhoea virus. Dr. Pritchard of Florida (1960) has shown that our mucosal disease antiserum neutralises this strain of virus diarrhoea virus indicating that the two agents are the same or closely related. However, Red Deer 7 antiserum obtained when the animal was apparently recovering from malignant catarrh did not neutralise Oregon C.24 virus when tested by Dr. Gillespie of New York (1960).

Rinderpest

Experimentally this is characterised by a short incubation period of 2 to 4 days followed by a persistent high temperature and clinical signs. Diarrhoea or dysentery is a feature of the disease. Further, the virus is stable, and the disease is transmissible by filtrates.

Blue Tongue

The standard diagnostic for Blue Tongue in cattle is to make 3 serial passages of blood intravenously through sheep at 7- to 10-day intervals. This was carried out as shown in Table V. Other than a slight rise of temperature at 7 and 8 days post inoculation in the first pair of sheep inoculated, no other clinical change was noted.

Vesicular Stomatitis

Karstad and Hanson (1957) described vesicular

R. A. HUCK, A. SHAND, P. J. ALLSOP & A. B. PATERSON.—MALIGNANT CATARRH OF DEER

FIG. 1.—Red Deer 4, sick 4 days.

FIG. 2.—Red Deer 2, head and muzzle.

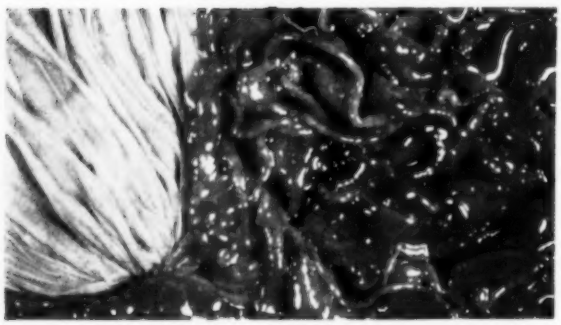

FIG. 3.—Red Deer 1, abomasum.

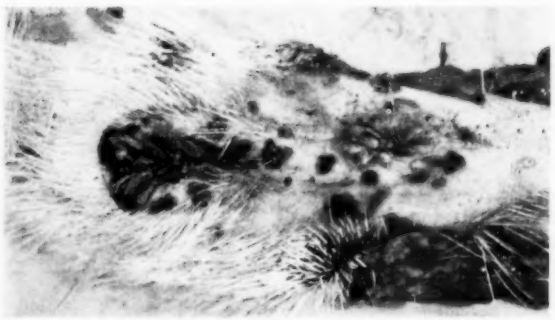

FIG. 4.—Red Deer 3, perianal lesions.

FIG. 5.—Calf c. 1538, head.

FIG. 6.—Calf c. 1538, hard palate lesions.

PLATE VII.—Red Deer 7. Hard palate × 60.

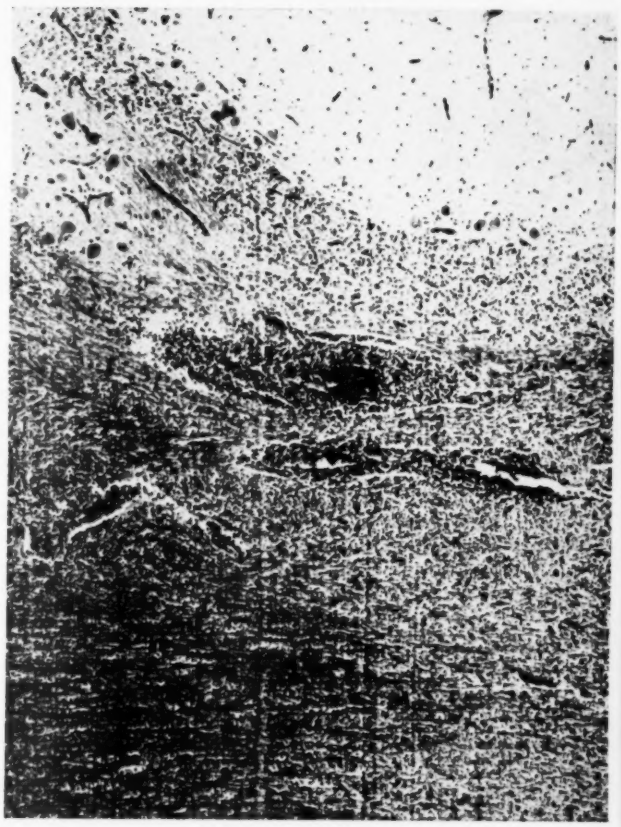

PLATE VIII.—Red Deer 7. Cerebellum × 60.

TABLE V
PASSAGES IN SHEEP

Passage number	Inoculum	Sheep number	Result	
1	Blood and tissues of Red Deer 4	S. 786 S. 787	Temperature 104°·8 F. 8 day P.I. Temperature 104° F. 7 day P.I.	Bled 10 days
2	Blood of S. 786 and S. 787	S. 1061 S. 1065	No reaction No reaction	Bled 8 days
3	Blood of S. 1061 and S. 1065	S. 1240 S. 1241	No reaction No reaction	

stomatitis in deer. Transmission carried out in deer by intramucosal inoculation of the tongue and intradermal inoculation of the muzzle and/or coronary band caused vesicular lesions 24 to 48 hours later. In view of the occurrence of a mild disease in some experimental calves, the principal lesion of which was a stomatitis, we attempted transmission by intradermal inoculation of the muzzle and buccal epithelium of calves with a tissue suspension of the hard palate and various parts of the digestive tract of an experimentally infected red deer. The calves did not develop disease. This, together with the lack of cytopathogenicity in tissue cultures serves to differentiate vesicular stomatitis from the disease investigated.

Anaplasmosis

Anaplasma bodies were not present in the erythrocytes of the deer examined. There were no signs of anaemia, the blood was not watery and splenic enlargement was absent.

Foot-and-Mouth Disease

The short incubation period with vesicular lesions was not observed in this disease. The cultures used would have shown cytopathic effect in the presence of foot-and-mouth virus. Complement fixation tests carried out at the Animal Virus Diseases Research Institute, Pirbright, were negative for foot-and-mouth virus.

Discussion

Malignant catarrh has been recognised as a clinical entity in cattle for over a hundred years in Europe. Mettam (1923) in South Africa described a transmissible disease called "snotsiekte." About 1930 it was decided on the evidence available that "snotsiekte" and malignant catarrh were one and the same disease. Dobberstein (1925) cited by Daubney and Hudson, reported characteristic infiltrative lesions of the brain, later confirmed by other workers. Goetze (1930) described 4 forms of malignant catarrh—peracute, alimentary, head-and-eye and mild. The head-and-eye form is the most widely described, and it is this form of the disease with which we are concerned. The causal agent is thought to be of a viral nature. One of the problems associated with outbreaks of malignant catarrh is the origin of infection. In Europe, sheep and latently infected cattle have been suspect, and in Africa, sheep and wildebeest. Daubney and Hudson (1936) suggested they had transmitted a mild type of disease to sheep. Piercy (1953) failed to obtain direct evidence to support field observations that sheep could transmit the disease. Stenuis (1953) did apparently transmit the disease from cattle to sheep, and sheep to cattle. Mettam (1923) transmitted the disease from an apparently healthy wildebeest to cattle. There were sheep and wildebeest in the park where this outbreak of disease occurred. They were not investigated in relation to this outbreak.

Another difficulty associated with malignant catarrh is the transmission of the disease in cattle. Daubney and Hudson (1936) found two strains transmissible, one of which died out after 2 cattle passages. Piercy (1952) established one out of four strains in cattle. One strain which was not transmissible failed to cause disease after 5 separate attempts. Our transmissions through Red Deer have been straightforward, but the attempt to establish infection in calves was not very successful.

The outbreak of disease in the Père David's deer resembled clinically the head-and-eye form of malignant catarrh described in cattle. In view of the peculiar circumstances of the outbreak of the disease when 8 of 14 animals succumbed, it was desirable to attempt diagnosis of the condition if only to eliminate the possibilities of rinderpest, foot-and-mouth disease, blue tongue, and vesicular stomatitis. Zoological parks are not ideally situated from the aspect of disease security, and there is a potential risk of disease being transferred to indigenous domestic animals.

There are few references to bovine malignant catarrh in the British Isles. In 1944, Tutt described a single case in Hampshire, and remarked upon the rarity of the occurrence of the disease. Other cases were reported from Ireland by Pierse (1943), O'Farrell (1950) and Hunter (1952). These cases were diagnosed on the clinical evidence available. In this respect it is interesting to note that cases subsequently diagnosed as mucosal disease (Huck, 1957) were frequently submitted with a tentative diagnosis of malignant catarrh. During the course of that work, Huck failed to identify malignant catarrh. There is no recorded experimental evidence of the condition in this country.

Little is known of the occurrence of malignant catarrh in deer. In North America, Skinner (1922) mentions the disease in the American pronghorn

(*Antilocapra americana*). Mills (1936) noted the occurrence of blindness and opacity of the eyes with a necrotic stomatitis in the elk (*cowus canadensis*). Cass (1947) reported necrotic stomatitis with buccal food impaction in both the Elk and Whitetail deer. Only the clinical findings are recorded, some features of which were found in the outbreak of disease we investigated.

Fay, Boyce and Youatt (1956) described an outbreak of transmissible disease of deer. Bacteria or toxins were not implicated. The condition was transmissible by the inoculation of whole blood by the intravenous or intramuscular routes. The incubation period was 8 to 10 days, much shorter than in the disease we investigated, and oral lesions were not recorded. There were features of the clinical and *post-mortem* findings similar to those we found.

The severe acute disease in our experimental calves resembled very closely the syndrome described as the head-and-eye form of bovine malignant catarrh. The mild form of the disease characterised principally by stomatitis does not appear to be a chance infection. It occurred in 5 calves, 2 of which were in contact with an acutely ill calf. The lesions were confined to the hard palate in all but one which showed ulcers in the buccal mucosa. Clinically this stomatitis was very different from that observed in the severe acute disease in both calves and deer. There were no clinical signs referable to mouth lesions, the animals ate well and were apparently normal on superficial observation; it was only on examination of the mouth that the lesions were obvious.

Our difficulties in transmitting the disease to rabbits are similar to those of other workers. Of 6 attempts, 1 was successful. Daubney and Hudson (1936) established one of two strains in rabbits, whilst Piercy (1953) established one of three strains. Pattison (1946) appears to have been fortunate in establishing the one strain with which he was working. These workers were able to re-isolate the disease in rabbits and thereby confirm the original result. We, however, only succeeded in one attempt.

The histological results obtained from our experimental animals closely resembled the changes described by Daubney and Hudson (1936), Plowright (1953), Stenius (1952) and Daubney (1959) as associated with the head-and-eye form of bovine malignant catarrh. The lesions were not so marked in the Père David's deer or in the experimental calves. They were most marked and characteristic in the experimentally infected Red Deer. In all rabbits, the liver changes were very severe and obvious; in contrast lesions of the cerebral hemispheres were only seen in 6 of the 10 rabbits examined. Characteristic lesions of the epithelial surfaces were recorded in all the species.

The fragility of the causal agent of malignant catarrh is a characteristic making it a difficult disease with which to work. It will not withstand freezing and thawing (Anon., 1941) and the loss of viability under various conditions of storage has been recorded by Piercy (1953). The inability of filtrates to cause disease is recorded; this may be associated with the need for cellular material in the inocula. We were unable to transmit disease to a deer using suspensions of tissues stored for 52 days at +4° C. and −20° C., together with citrated whole blood stored at +4° C. for the same period. Rabbit tissues stored at +4° C. for 7 days remained infective for rabbits, but resulted in a prolonged mean incubation period of 60 days, in contrast to an incubation period of 20.3 days when the same tissues were inoculated as fresh material. A 450 μ gradocol membrane filtrate was also non-infective for one deer. These findings indicate properties that are similar to those described for the causal agent of bovine malignant catarrh.

Our experiments do not allow an exact identification of the disease of Père David's deer with bovine malignant catarrh, but the symptomatology, *post-*

(*Concluded at foot of page* 465)

TABLE VI
PASSAGES IN RABBITS

Passage	Incubation period days			Duration of illness to natural death days			Clinical disease
	Number of rabbits	Range	Mean	Number of rabbits	Range	Mean	
First	1		50	1		3	Nasal and ocular discharge
Second	3	26—33	30	1		1	One ocular discharge, two paraplegia
Third	5	18—28	22	3	1—34	9	Two nasal and ocular discharge, with heads erect. One dull. Two nasal and ocular discharge
Fourth	9	11—28	20·3	7	1—10	4·3	All nasal and ocular discharge. One head erect. Two scouring
Fifth	9	20—36	23·8	4	2—22	7·7	All nasal and ocular discharge, two scouring
Sixth	14	10—45	25·6	10	1—8	2·7	Eight nasal and ocular discharge. One dull. One no signs.
Seventh	4	6—30	22·5	2	6—30	18	One no signs. Two ocular and nasal discharge. One dull.
Eighth	4	26—41	29·7	1		1	All ocular and nasal discharge

Our experiments do not allow an exact identification of the disease of Père David's deer with bovine malignant catarrh, but the symptomatology, *post-*

1,2-dimethyl-5-nitroimidazole, 8595 R.P.*

Part I—Prophylactic Activity Against Experimental Histomoniasis in Turkeys

BY

J. M. S. LUCAS
Veterinary Research Division, May & Baker Ltd., Ongar, Essex

SUMMARY.—The results obtained by treatment with 8595 *R.P.* (1,2-*dimethyl-5-nitroimidazole*) *of turkeys experimentally infected with enterohepatitis* (*by oral dosing with* Heterakis gallinae) *are presented. Against this infection* 8595 *R.P. was more potent than acinitrazole* (2-*acetamido-5-nitrothiazole*) *or nithiazide* [1-*ethyl*-3-(5-*nitro*-2-*thiazolyl*)*urea*] *when fed as a preventive, commencing* 48 *hours before infection.*

Introduction

FOR the laboratory testing of compounds for the control of histomoniasis (blackhead) turkeys experimentally infected by the administration of the causal organism, *Histomonas meleagridis*, or the embryonated ova of the chicken caecal worm, *Heterakis gallinae*, are used. Waletzky, Brandt, Bliznick and Hughes (1949) and Cuckler and Malanga (1956), respectively, discovered the activity of 2-amino-5-nitrothiazole and 1-ethyl-3-(5-nitro-2-thiazolyl)urea using these experimental infections. This paper describes the results obtained with 8595 R.P., which is 1,2-dimethyl-5-nitroimidazole, a white crystalline powder, first described by Bhagwat and Pyman (1925), and compares the activity of this compound with that of acinitrazole and nithiazide in the treatment of the experimental infection.

* The common name dimetridazole has been suggested for this compound.

Materials and Methods

Experimental birds

Day-old, straight run, Broad Breasted White poults were obtained from a commercial hatchery. The poults were reared on wire floors in a gas heated brooder and fed an open formula turkey starter mash and water, both of which were freely available. When 14 days old they were transferred to wire floored cages in a heated room. Lighting was adjusted to give 16 hours' light in each 24 hours.

The experimental turkeys were infected *per os* with 600 to 1,000 embryonated *Heterakis gallinae* ova suspended in 2 ml. distilled water.

Experimental Diet

The poults were fed a basal turkey starter diet prepared according to a formula supplied by the Houghton Poultry Research Station (Table I) and compounds for testing were blended in this at different concentrations using an electrically driven "Hobart" mixer with a stainless steel bowl. The compound 8595 R.P. was incorporated in the meal as a premix prepared by adding plain wheat flour to the compound which had previously been ground to a fine powder.

Acinitrazole and nithiazide were incorporated using the commercially available premixes containing 22.5

Malignant Catarrh of Deer.—*Concluded.*

mortem, biological and histological findings strongly suggest a very close relationship between the two diseases.

Acknowledgments.—Our thanks are due to the Zoological Society of London who provided the deer for use in the experiments. We also wish to thank Mr. R. Daubney, Dr. S. E. Piercy and Mr. W. Plowright who examined histological sections and gave us much helpful advice and comments upon the experimental cases. We are indebted to Drs. W. R. Pritchard and J. H. Gillespie for carrying out examinations of sera.

References

ANON. (1941). Ann. Rep. of the Vet. Dept., Colony and Protectorate of Kenya.
BUSHELL, S. W. (1898). *Proc. Zool. Soc. Lond.* 588 (cited by Jones).
CASS, J. S. (1947). *J. Wildl. Manag.* **11.** 91.
DAUBNEY, R., & HUDSON, J. R. (1936). *J. Comp. Path. and Therap.* **49.** 63.
———. (1959). Letter. *Vet. Rec.* **71.** 493.
DULBECCO, R., & VOGT, M. (1954). *J. Exp. Med.* **99.** 167.
FAY, L. D., BOYCE, A. P., & YOUATT, W. G. (1956). *Trans. N. Amer. Wildl. Conf.* **21.** 173.
GILLESPIE, J. H. (1960). Personal communication.
GOETZE. (1930). *Deuts. tierartztl. Wschr.* (1930). (Cited by Daubney and Hudson).
HUCK, R. A. (1957a). *J. Comp. Path. and Therap.* **67.** 267.
———. (1957b). *Vet. Rec.* **60.** 1,207.
HUNTER, W. M. D. (1952). *Irish. Vet. J.* **6.** 279.
JONES, F. WOOD. (1951). *Proc. Zool. Soc. Lond.* **121.** 319.
KARSTAD, L., & HANSON, R. P. (1957). *Amer. J. Vet. Res.* **18.** 162.
METTAM, R. W. M. (1923). 9th and 10th Reps. Director of Vet. Educ. and Res., Union of S. Africa. 393.
MILLS, H. B. (1936). *J. Mammal.* **17.** 250.
O'FARRELL, J. D. (1950). *Irish Vet. J.* **4.** 20.
PATTISON, I. H. (1946). *J. Comp. Path.* **56.** 254.
PIERCY, S. E. (1952). *Brit. Vet. J.* **108.** 35 and 214.
———. (1953a). *Ibid.* **109.** 59.
———. (1953b). *XVth Inter. Vet. Cong. Proc. Pt.* 1. **1.** 328.
PIERSE, R. R. (1943). *Vet. Rec.* **55.** 387.
PLOWRIGHT, W. (1953). *XVth Inter. Vet. Cong. Proc. Pt.* 1. **1.** 323.
PRITCHARD, W. R. (1960). Personal communication.
RICHARDS, S. H., SCHIPPER, I. A., EVELETH, D. F., & SHUMARD, R. F. (1956). *Vet. Med.* **51.** 358.
SKINNER, M. P. (1922). *J. Mammal.* **3.** 82.
STENIUS, P. I. (1952). A treatise on "Bovine Malignant Catarrh," Institute of Pathology, Veterinary College, Helsinki.
TONG, E. H. (1957). *Proc. Zool. Soc. Lond.* **129.** 343.
TUTT, J. B. (1944). *Vet. J.* **100.** 214.
YOUNGNER, J. S. (1954). *Proc. Soc. Exp. Biol. and Med.* **85.** 202.

per cent. w/w. 2-acetamido-5-nitrothiazole, and 20 per cent. w/w. 1-ethyl-3-(5-nitro-2-thiazolyl)urea respectively.

Experimental Technique

The 14-day-old poults were divided into groups and fed the medicated or unmedicated diets for 21 days. Forty-eight hours after the commencement of medication, the birds were infected with *H. gallinae* ova. Records of deaths from enterohepatitis were maintained during the 21-day period of medication and for a further 10 days, during which the survivors received unmedicated diet. The survivors were then killed and examined *post-mortem* for lesions of infectious enterohepatitis. The efficacy of treatment was assessed on the number of surviving poults protected, *i.e.* showing no lesions at *post-mortem* examination.

Results

The results obtained in comparative tests using graded concentrations of 8595 R.P., acinitrazole and nithiazide are summarised in Table II. All poults in the non-medicated, infected groups either died of enterohepatitis or showed well-developed caecal

TABLE I

BASAL TURKEY STARTER DIET
(Houghton Poultry Research Station formulation)

	lb.
Ground Wheat	37
Ground Oats	15
Ground Maize	10
Fish Meal (66 per cent.)	10
Soyabean Meal (44 per cent.) ...	25
Dried Grass Meal	5
Dried Skimmed Milk Powder ...	3
Unextracted Dried Yeast	3
Limestone Flour	2
Steamed Bone Flour...	1·5
Manganised Salt	0·5
Choline Chloride	0·1
	112·1
Supplements	
Vitamin A (I.U./ton)	8,000,000
Vitamin D_3 (I.C.U./ton)	2,000,000
Vitamin B_2 (mg./lb.)	2
Pantothenic acid (mg./lb.)	5
Nicotinic acid (mg./lb.)	20
α-Tocopheryl acetate (mg./lb.) ...	5
Lysine (lb./ton)	1
Methionine (lb./ton....	½

TABLE II

COMPARATIVE EFFECT OF 8595 R.P., ACINITRAZOLE AND NITHIAZIDE IN EXPERIMENTAL ENTEROHEPATITIS INDUCED WITH *Heterakis gallinae*

Medication		Poults protected/poults infected									
Compound	Per cent. w/w. in diet	Comparative Test Number								Totals	Per cent.
		1	2	3	4	5	6	7	8		
8595 R.P.	0·025	5/5								5/5	100
	0·012	5/5			10/10					15/15	100
	0·008							8/10	8/10	16/20*	80
	0·005				5/10			8/10	9/10	22/30*	73
	0·003		2/5					4/10	4/10	10/25*	40
	0·0025			2/10	2/10					4/20*	20
	0·001		1/5	0/10						1/15	7
	0·0005		0/5							0/5	0
Acinitrazole	0·025	5/5	5/5	10/10						20/20	100
	0·02				10/10	5/5				15/15	100
	0·016			9/10				4/10	6/10	19/30*	63
	0·0125		2/5							2/5	40
	0·01			5/10	4/10			5/10		14/30*	46
	0·006		1/5	3/10				0/10		4/25*	16
	0·005				0/10	0/5	0/5			0/20	0
Nithiazide	0·04							6/8	2/10	8/18	44
	0·03								0/10	0/10	0
	0·025						3/10		1/10	4/20	20
	0·02					2/5	0/10			2/15	13
	0·016						0/9			0/9	0
Infected controls	—	0/10	0/5	0/8	0/6	0/5	0/9	0/10	0/10	0/63	0

* Totals used to calculate PD.50

Compound	PD. 50 (per cent. w/w.)	Slope " b "	Limits of error (per cent.)
8595 R.P.	0·0038	4	85–118
Acinitrazole	0·011	3·5	82–121

and hepatic lesions of the disease at *post-mortem* examination.

A dose-response effect was observed with the various concentrations of 8595 R.P. and acinitrazole and from these results the approximate concentration of the compounds that protected 50 per cent. of the birds (PD.50) was calculated by the method of de Beer (1945). The PD.50 of 8595 R.P. was 0.0038 per cent. w/w. and of acinitrazole, 0.011 per cent.

Discussion

The inoculation of between 600 and 1,000 embryonated *Heterakis gallinae* ova used in these tests produced a 100 per cent. infection rate in the infected, untreated control poults. Cuckler *et al.* (1956) using 14-day-old Beltsville White poults and a similar experimental technique recorded a 91 per cent. infection rate using approximately 200 embryonated *H. gallinae* ova, and it is possible the minimum dose required to produce a 100 per cent. infection rate may be less than was used in these tests.

The data presented show that 8595 R.P. (1,2-dimethyl-5-nitroimidazole) is highly effective in the prevention of experimental enterhepatitis in turkeys, and is approximately three times as potent as acinitrazole. In the preventive tests nithiazide administered in the food was less active than either 8595 R.P. or acinitrazole.

Results (to be published) of laboratory and field studies with 8595 R.P. administered in the food and drinking water to growing turkeys and chickens have shown the compound to be well tolerated at concentrations up to 0.1 per cent. w/w. in the diet, and tests to establish the effect of 8595 R.P. on reproduction are in progress.

Acknowledgment.—The technical assistance rendered by Mrs. A. C. Langford is gratefully acknowledged.

References

BHAGWAT, V. K., & PYMAN, F. L. (1925). *J. chem. Soc.* **127**. 1,834.
CUCKLER, A. C., & MALANGA, C. M. (1956). *Proc. Soc. exp. Biol., N.Y.* **92**. 485.
DE BEER, E. J. (1945). *J. Pharmacol.* **85**. 1.
WALETZKY, E., BRANDT, H. C., BLIZNICK, A., & HUGHES, C. O. (1949). *J. Parasit.* Sect. 2. **35**. 16.

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IN PARLIAMENT

Bulls

MR. DE FREITAS (May 4th) asked the Minister of Agriculture, Fisheries and Food whether he will arrange for bulls of the three leading British beef breeds, Hereford, Angus, and Lincoln Red, to be tested in the same way and under the same conditions as the French Charollais bulls.

MR. VANE: Details of the Charollais trial have still to be settled and we are arranging to consult the interested organisations about this. We would hope, however, to arrange for certain farmers participating in the trial to rear a number of British beef/dairy crosses alongside the Charollais/dairy crosses.

MR. DE FREITAS: Will the hon. Gentleman make it clear that, when Charollais are to be tested, it is meaningless unless the leading British beef breed bulls are tested under similar conditions?

MR. VANE: I thought that my reply implied that it is intended to carry out certain trials, although I would not necessarily say that one beef breed was better than any other.

Poultry (*Post-mortem* Service)

MR. MAWBY (May 4th) asked the Minister of Agriculture, Fisheries and Food if he is satisfied that the amount now charged for *post mortem* on poultry will not deter small poultry keepers from using this service; and if he will make a statement.

MR. VANE: Since the fees for *post-mortem* examination of poultry at the Ministry's Laboratories were increased, the number of specimens submitted has fallen, but I cannot say how much of this fall is attributable to small poultry keepers. These fees were originally fixed in 1925 and had become almost nominal. Even at these new rates, the service will not yet be self-supporting but, as already announced, it is my right hon. Friend's intention to introduce full economic fees on December 1st, 1961.

MR. MAWBY: While thanking my hon. Friend for that reply, may I ask him to take into account the fact that many eggs are produced by backyard poultry-keepers? Will not the charge for *post-mortem* examinations mean danger of a disease not being diagnosed because the owner may bury the evidence?

MR. VANE: I am aware of the dangers from disease, but it is in the interests of any poultry-keeper, who suspects that one of his birds has died of disease, to have a *post-mortem* examination carried out. There are many ways open to him. The veterinary profession in private practice is available. This does not seem to be a service which the State is justified in running at well below cost.

MR. DE FREITAS (May 8th) asked the Minister of Agriculture, Fisheries and Food which are the three British beef breeds which have the largest number of licensed bulls.

MR. SOAMES: I am not able to say how many of the bulls of each breed licensed in past years are still being used for service, but over the past five years the three beef breeds for which the greatest numbers of licences have been issued in Great Britain are as follows: 13,441 for Hereford, 13,248 for Aberdeen Angus and 4,403 for Galloway.

The Report of the Duke of Norfolk's Committee to the Stewards of the Jockey Club and National Hunt Committee

THIS very interesting report is of the greatest importance to all who are connected with racing, indeed to the bloodstock industry as a whole, and also to the veterinary profession. The volume of evidence which has been so carefully sifted and appraised, indicates the determination of the Committee to find the best possible solution to the problem of the doping of race-horses.

The report commences by stating, that from the evidence heard, the Committee do not believe that very much doping takes place, and the scope of this evidence is indicated by the list of witnesses, published as an appendix, representing every aspect of racing and including twenty-eight veterinary surgeons. However limited the malpractice of doping may be, steps to control it must be taken at once and the Committee are of opinion that the best means will be the provision of adequate deterrents.

The report then proceeds to consider all the various aspects of the problem under separate headings.

In relation to breeding, the rule requiring disqualification for life of horses which have been doped, is considered too harsh, and the Committee recommends that generally speaking suspension for a period of 3 months would suffice. At the same time they stress the importance that a horse should have won on its own merit and not as a result of trickery.

The responsibility of the trainer for the horses under his care is emphasised, together with the necessity for adequate security measures in the stable yard. The difficulties arising when horses are away from the yard, or travelling between meetings are examined, together with the responsibilities of employees. Under this section 2 recommendations are made: that certain instructions should be printed on the licence issued to a trainer, and that where a horse has been found to have been doped, the employee who was in charge of the horse at the material time should be held responsible as well as the trainer.

It is recognised that drinks, tonics and vitamins given to horses on veterinary advice, and with no sinister intention, could result in an accusation of doping if a test were carried out. Paragraph 59 of the report reads:—

"The Avoidance of Pre-Race Medication. In view of the fact that the majority of doping agents can be used legitimately in therapeutic medicine it is important to distinguish between such legitimate use and their use to affect the speed of a race-horse. . . . Most owners, trainers, and veterinary surgeons agree that racing should be confined to horses that are fit and healthy. Any animal that is not fit to race without the assistance of a therapeutic agent should not be allowed to run until such aid is unnecessary."

To meet this, the recommendation is that trainers should be instructed that no substance, or medicament, should be given to a horse within a period of 72 hours of noon on the day it is to be raced.

To replace the existing system of *ad hoc* testing, a system of routine testing is advocated. By this it is hoped to remove any idea which may have existed, but of which there is no evidence, that there has been any lack of impartiality in selecting cases for test. The main considerations however, when deciding on this recommendation, were what is best for racing in this country and what will provide the most effective deterrent to doping. The systems in use by no fewer than 10 turf authorities in other countries were examined.

In addition to the routine testing the Stewards should retain the right to sample any other horse. This right would, presumably, be exercised on veterinary advice when clinical symptoms were observed giving cause for suspicion.

In order to define the term "doping" in a form which will stand the test of legal interpretation, the Committee consulted the British Veterinary Association, the Royal Institute of Chemistry and the Society of Chemical Analysts. The following formula was agreed: "Doping is defined as the administration to a horse prior to a race for which it is or is to be a declared runner of anything which may alter its speed, stamina, courage or conduct in the race, excluding those things which are recognised as normal nutrients when found in physiological amounts."

The necessity for veterinary inspection is repeatedly referred to and the practical difficulties of adequate clinical examination at race meetings are admitted. However, the presence of an official veterinary surgeon to scrutinise horses at a race meeting is considered to be a deterrent to the practice of doping, particularly when it is known that any suspicious clinical symptoms will lead to the taking of samples for a confirmatory chemical analysis. Athough it does not appear as a separate item in the final recommendations, in paragraph 53 of their report the Committee state: "Proper facilities for a full veterinary inspection of a horse and for the taking of any necessary samples from it should be available at all race-courses."

The report next proceeds to review the various types of substances which may be used as doping agents. In this section it draws attention to The Guide to Professional Conduct, 1961, issued by the Royal College of Veterinary Surgeons, and quotes Clause 57 relating to the administration of drugs and tranquillisers to race-horses and Greyhounds.

The detection of doping agents by chemical means is discussed. While recognising the importance of veterinary evidence, it is appreciated that the final confirmation of a clinical diagnosis must depend for positive proof on the analyst. The proposals for division of samples taken for analysis are detailed in the final recommendations.

The taking of samples from a horse is reviewed in considerable detail. Sampling of sweat is discarded by common agreement on the grounds of the small quantity which can be collected and the possibilities of contamination.

Saliva would appear to be the sample which attracts most general approval, the only point against it being the limited quantity which can be collected. The present method of collection in this country is on dry sterile swabs, but in some other countries the swabs are treated with acetic acid which stimulates the flow of saliva. No doubt the adoption of this method will receive further consideration.

Urine is regarded as the most satisfactory specimen from the point of view of the quantity which can be made available to the analysts. The report discusses the practical difficulties of obtaining urine samples, particularly in relation to the limited time available and the environmental factor. It is appreciated that it will not always be possible to obtain urine samples, particularly from horses affected by strange surroundings and the excitable atmosphere of a race-course.

The report next turns to the taking of blood samples, and it is only here that there appears to be any divergence of opinion by the Committee from the expert advice contained in the memoranda published as appendices to the report. The Committee of the British Veterinary Association in their memorandum concluded that under existing conditions the taking of blood samples is not practicable, and they state the relevant reasons. The memorandum prepared by representatives of the Royal Institute of Chemistry and Society for Analytical Chemistry offers this opinion: "Blood samples could be used but they have, as far as the analyst is concerned, the disadvantage of being more difficult to 'clean up' and prepare for analysis." They recommend samples of saliva and urine.

In the final recommendations of the report the Committee have preferred samples of saliva and urine, but ". . . blood may be taken but only with the consent of the owner or his representative." It is possible that such consent would not infrequently be withheld.

Finally the report turns to what may well be the most important recommendation of the Committee: the need for research. It will surely be universally welcomed, that it is proposed to set up a research laboratory adequately staffed and equipped to work in close collaboration with veterinary surgeons and analytical chemists. The existing formidable list of drugs which could be used as doping agents is expanding at an ever-increasing pace, as pharmaceutical companies all over the world are daily introducing new products. In some countries the use of endocrine therapy to improve racing performance and condition is now practised, as opposed to the more orthodox chemical tonics and vitamins. Perhaps, if any monies become available from the Betting Levy, they might appropriately be employed to assist in some measure the research which is so obviously necessary.

A further recommendation, which must give satisfaction on all sides, is that the Jockey Club should set up an advisory committee comprising a veterinary surgeon, a chemist and a pharmacologist to assist the Stewards in the interpretation of veterinary and analytical reports.

The remaining part of the report is concerned with changes in the Rules of Racing and of the National Hunt Rules which would be necessary to implement some of the Committee's recommendations.

Although we print in full the Summary of recommendations by the Duke of Norfolk's Committee, it is to be hoped that all members of the profession who are in any way connected with race-horses or interested in racing, will find the opportunity to read in full this outstandingly valuable report, to which so many veterinary surgeons have contributed their advice and experience.

THE DOPING OF RACE-HORSES: REPORT OF THE COMMITTEE SET UP BY THE JOCKEY CLUB

Recommendations

1. That routine sampling of the winners in at least two races per day at a race meeting should be made, the races for sampling being chosen by ballot and announced just before the race; and further that the Stewards should retain the right to sample any other horse.
2. That two separate samples should be taken from a horse, preferably saliva and urine; blood may be taken but only with the consent of the owner or his representative.
3. That samples for chemical analysis should be divided into three, the first portion to go to a laboratory set up by the Jockey Club for routine analysis, the second to go, if desired by the owner or his representative, to an analyst selected by him from a list of chemists approved by the Jockey Club and the third to be retained for submission to an agreed analyst in cases of doubt or disagreement. A copy of the veterinary report should accompany the sample sent to the analyst.
4. That the Jockey Club should set up an advisory Committee comprising a veterinary surgeon, a chemist and a pharmacologist to assist the Stewards in the interpretation of the veterinary and chemical reports concerned with any case of alleged doping under investigation, the members of this panel to be chosen from a short list of suitable persons, who shall however be independent of the examinations made in the particular case.
5. That in order to obtain further information upon the physiological action and detection of doping agents, notably the new substances, a research laboratory should be established.
6. Instructions to Trainers: That the following instructions be printed on the licence:—
   (a) No substance or medicament should be received by a horse within a period of 72 hours preceding noon on the day it is to be raced. During that period of time the horse should receive nothing apart from its normal nutrients.
   (b) Trainers are warned against the danger of using remedies of unknown composition and of the necessity of ensuring that all medicines are kept locked up, and that the key is in the possession of a responsible person.
7. That more discretion should be exercised with regard to the disqualification of horses under Rule 66 (c) of the Rules of Racing and Rule 65 of the National Hunt Rules, and consideration should be given to a period of suspension for 3 months before the horse is allowed to race again.
8. That a trainer's employee who was in charge of the horse at the material time should be held responsible as well as the trainer.
9. That Rule 102 (ii) of the Rules of Racing and Rule 97 (2) of the National Hunt Rules require amendment and that they should be as follows:—
   102 (ii): 97 (2).
   A. If in any case in which the Stewards have ordered

(Concluded at foot of page overleaf)

Current Literature

ABSTRACTS

Resuscitation of a Parakeet. MICHAEL, S. J. (1960). *J. Amer. vet. med. Ass.* **137.** 105.

Dr. Michael explains how, after the injection of 2 or 3 minims of a 1 per cent. procaine solution around the proposed wing amputation area, the bird —a green Parakeet of 10 years old—collapsed and appeared dead. Dr. Michael conducted artificial ventilation of the lungs, using his fingers and thumb, at the rate of 2 manipulations per second, and introduced the bird's head into a flow of oxygen of 1 to 2 litres per minute. The bird survived the ordeal.

The experience, however, appears to add authority to the abstractor's opinion that procaine solutions or procaine based drugs should never be used on Parakeets since the solutions appear to be highly toxic.

O. G-J.

The Treatment of Liver Fluke Infestation in Sheep and Cattle Using "Bilevon"—Bayer (Hexachlorophen). (Translated title.) FEDERMANN, M. (1959). *Dtsch. tierärztl. Wschr.* **66.** 526.

Hexachlorophen is a chlorinated diphenyl compound, soluble in oil and alcohol but not in water. In this particular work, 1,011 sheep of various ages and breeds were treated, it having been previously established that at least 75 per cent. were infested with liver-fluke. Oral dosage (911 sheep): a 30 per cent. wettable powder, 50 g. of which were suspended in 1 litre of water, dosed 1 ml. per kg. bodyweight using the "Sucosyringe." Subcutaneous dosage (100 sheep): a 15 per cent. solution in oil, dosed 1 ml. per kg. bodyweight. Half the animals were dosed according to estimated weight, the others according to age as follows: yearlings, 40 ml.; ewes, 50 ml.; fat lambs, 60 to 65 ml. No generalised disturbances were noted following oral dosage. Local irritation of variable degree and incidence occurred at the injection site, in some cases persisting up to 14 days.

Results of treatment. Faeces examination was checked by *post-mortem* control, and while 89 per cent. of treated sheep were free of fluke after 6 weeks as judged by the absence of eggs in faeces, 90 per cent. were found clear on slaughter at a similar interval. At a dosage of 20 mg. per kg. bodyweight no flukes could be found at slaughter.

Toxicity. White male mice survived when given 100 mg. per kg. bodyweight of the powder orally, some survived at the 250 mg. per kg. bodyweight level, but all died at the 500 mg. per kg. bodyweight level. Forty sheep given 40 mg. per kg. bodyweight on each of 2 successive days, repeated 3 weeks later, survived. Four from a total of 20 sheep died following a dosage of 60 mg. per kg. bodyweight, while 2 others recovered after initial lameness in fore and hind quarters.

Treatment of cattle. Ten cattle aged 6 to 8 years, known to be infested with liver-fluke, were treated with the wettable powder at a dosage of 10 mg. per kg. bodyweight and 20 mg. per kg. bodyweight, forming 2 groups of 4 animals, and leaving 2 controls. Slaughtered 8 days after treatment, the results were satisfactory and larger trials are now in progress. To check the toxicity in cattle 10 cattle were dosed with 20 mg. per kg. bodyweight with no untoward effects, and then 15 cattle with 40 mg. per kg. bodyweight, whereby 1 animal died after 5 days.

The drug was also successfully used to control tapeworms (*Moniezia* spp.) in lambs at a dosage of 15 mg. per kg. bodyweight. It had no effect on strongyles or *Haemonchus contortus*. It is possible, in the ovine tapeworm trial, that "self-cure" was already in progress, because, since the date of infection was unknown, it was impossible to state

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The Report of the Duke of Norfolk's Committee.—*Concluded.*

a horse to be examined it is found that a substance other than a recognised normal nutrient has been administered to that horse for the purpose of increasing its speed or improving its stamina courage or conduct in a race, the licence of the trainer of the horse shall be withdrawn and he shall be declared a disqualified person and any other person who was in charge of the horse at the time when such substance was administered shall be declared a disqualified person: Provided that if it be established to the satisfaction of the (Stewards of the Jockey Club) (Stewards of the National Hunt Committee) that the trainer used all due diligence to prevent the occurrence and that the said substance was administered without his consent, connivance or default his licence shall not be withdrawn and he shall not be declared a disqualified person: and if it be established to the satisfaction of the (Stewards of the Jockey Club) (Stewards of the National Hunt Committee) that any person who was in charge of the horse when such substance was administered used all due diligence to prevent the occurrence and that the said substance was administered without his consent, connivance or default, such person shall not be declared a disqualified person.

102 (ii); 97 (2).

B. If in any case in which the Stewards have ordered a horse to be examined it is found that any substance has been administered to that horse for the purpose of decreasing its speed or adversely affecting its stamina, courage or conduct in a race, any person who administered or was a party to, or connived at, the administration of such substances to that horse shall be declared a disqualified person and in the case of a trainer his licence shall be withdrawn.

10. That Rule 176 (i) of the Rules of Racing and Rule 165 (1) of the National Hunt Rules require amendment and should be as follows:—

176 (1); 165 (1).

If any person shall administer or cause to be administered to a horse any substance other than a recognised normal nutrient for the purpose of affecting its speed, stamina, courage or conduct in a race; or . . .

whether the lambs had been infected for 3 months, at which time a spontaneous immunity appears to be built up. A. D. W.

The Anthelmintic Effect of Bephenium on *Ancylostoma caninum*. BURROWS, R. B. (1958). *J. Parasit.* **44.** 607.

Bephenium salts were used on dogs and cats which had natural infections of *Ancylostoma caninum*: they were bephenium chloride, bephenium bromide, bephenium iodide, and bephenium hydroxynaphthoate. Single doses of over 20 mg. per kg. bodyweight of the various bephenium salts resulted in the elimination of 99.4 per cent. of hookworms and single doses of less than 20 mg. per kg. bodyweight caused the loss of 94 per cent. hookworms. Generally all hookworms were eliminated during the first 24 hours after dosing, but in the majority of cases the majority of hookworms were passed in less than 7 hours after dosing. The action of these compounds on other parasites of dogs, particularly *Toxocara* species, *Trichuris*, and tapeworms, was very much less efficient than the action with hookworms. The author produces evidence to show that the anthelmintic effect of this series is in part a function of the concentration of the drug available to the worms and also the site of the worm in the host. This is exemplified by the fact that hookworms attached in the duodenal area are more likely to be attacked than those situated some distance down the intestinal tract. The only side-effects noted with this drug were nausea and vomiting and it is stated that this is rare in animals receiving a dose of between 20 and 25 mg. per kg. bodyweight.

E. J. S.

Pathology of Epizootic Bovine Abortion. KENNEDY, P. C., OLANDER, H. J., & HOWARTH, J. A. (1960). *Cornell Vet.* **50.** 417.

A form of seasonally epizootic bovine abortion occurs in California affecting primarily heifers taken into the foothills and mountainous portion of the state. The disease produces abortion during the last trimester of pregnancy. The foetal response to this disease is a focal or diffuse granulomatous change which may involve essentially all organs. Macroscopically these foetuses have a generalised lymphoid enlargement, a coarsely nodular liver, and multiple submucosal haemorrhages. The most striking gross lesion was the swollen, coarsely nodular liver, but the liver changes were considered to be secondary to basic vascular lesions; the most specific naked-eye change was the appearance of small grey foci which were regularly present in the ventricular muscle and renal cortices. The most diagnostic histological lesion occurred in the brain and took the form of a pleocellular accumulation, most commonly within the adventitia of the meningeal and parenchymal vessels, of mononuclears —suggestive of histiocytes and fibrocytes—plasma cells and lymphocytes; neutrophils were scarce. The meningitis was most prominent in the sulci of the cerebellum. Similar perivascular lesions occurred in the connective tissue of the foetal chorion.

The cause of the disease has not been ascertained but the foetal tissue response suggests an infectious agent; very similar histological reactions have been found in the foetuses of pregnant mice infected with psittacosis virus. The strictly geographic distribution suggests the involvement of a restricted area vector or a wild life reservoir of infection.

A Clinical and Genetic Study of Eye Cancer in Hereford Cattle. FRENCH, G. T. (1959). *Aust. vet. J.* **35.** 474.

Hereford cattle in tropical areas of Australia are peculiarly susceptible to eye cancer. Susceptibility is under genetic influence, and an hereditable factor which clearly predisposes to eye-cancer is lack of lid-pigmentation.

The present investigation, which lasted 2 years, was designed to study the relationship between those precursor lesions of eye cancer which are clinically visible, *viz.* plaques and papillomas of the conjunctival sac as well as keratoma and acanthosis of the eyelids, and pigmentation of the lids and of the corneo-scleral junction respectively. Observations were also made on the hereditability of eye pigmentation. The animals used at the beginning of the experiment were 189 Herefords and 150 Shorthorns, aged 7 to 8 years; 71 4-year-old Hereford cows and 150 Hereford calves (representing 3 years' progeny from matings of 7 Hereford bulls to the above-mentioned 189 mature Hereford cows) were also examined. In addition, data were obtained from 2 other nearby Hereford herds. All the cattle, except 29 brought from New South Wales, were bred in the Rockhampton vicinity of Queensland.

Precursor lesions occurred in up to 12.9 per cent. of the Hereford cattle but none was seen in the Shorthorn cattle. The cattle brought from New South Wales showed the same incidence as locally bred cattle. About half the precursor lesions recorded had disappeared at subsequent examinations but it is not known whether they recurred later. Eye cancer was unusual in cattle under 4 years old; peak susceptibility was at 7 to 8 years after which it may decline. In respect of the effect of degree of pigmentation and incidence of lesions, a highly significant negative correlation was established. (The eyelids of the Shorthorn cattle were free from unpigmented areas.) Also, lid pigmentation was a better indicator of susceptibility than corneo-scleral pigmentation. Lid pigmentation was found to be strongly hereditable; consequently it is recommended that attempts to reduce the incidence of eye cancer should be based on selection for a high degree of lid pigmentation.

G. H. A.

Bovine Mastitis Caused by *Nocardia asteroides* (translated title). HILLERMARK, K. (1960). *Acta vet. scand.* **1.** 281.

A 7-year-old cow, on the 3rd day after calving, developed acute mastitis in 1 quarter with severe systemic disturbance. In spite of intensive local and general treatment with sulphadimidine and a variety

of antibiotics, no improvement was observed until, after 3 weeks, an abscess developed on the udder and was drained surgically. The fever fell and the animal returned to normal health but as the affected quarter was greatly enlarged and very fibrotic the cow was slaughtered. *Nocardia asteroides* was isolated from milk samples and from the contents of the abscess. Sensitivity tests showed that the organism was partially sensitive to sulphaisodimidine and fairly sensitive to streptomycin and neomycin.

The Occurrence of Conditioned and Simple Copper Deficiency in Cattle and Sheep in Setesdalen, a Valley in the Southern Part of Norway. HAVRE, G. N., DYNNA, O., & ENDER, F. (1960). *Acta vet. scand.* **1.** 250.

It appears that the occurrence of copper deficiency in this area has been brought about largely by changes in farming practice. Whereas formerly the farmers grew cereals in the valley, grazed the hillsides and collected hay from the mountains, the practice has changed so that now hay making and grazing occur in the valley. As copper deficiency was suspected, herbage and soil analyses were made. From these analyses and from clinical observations it is concluded that the standards of normality for herbage copper and molybdenum given by Cunningham (1955) (*Advan. vet. Sci.* **2.** 138) are satisfactory. These are that 5 p.p.m. copper are sufficient in the absence of conditioning factors and that 3 p.p.m. molybdenum are harmless given normal copper levels. 3 to 10 p.p.m. molybdenum is harmful if copper levels are low and more than 10 p.p.m. molybdenum is harmful with normal copper levels. Clinical observations on 40 cases of conditioned copper deficiency and 10 of simple copper deficiency are described. The animals went to pasture in late June or early July and most cases of conditioned copper deficiency were seen in August to November. While the majority of conditioned cases occurred at the age of 2 to 3 years, simple copper deficiency was most common at about 1 year old. Twenty-two (55 per cent.) of the cases of conditioned copper deficiency occurred 30 days before or after calving. While the majority of the conditioned cases exhibited diarrhoea, which could be induced by shortage of water, none of the simple cases scoured. The first sign was usually depigmentation of the hair round the eyes and on the face. The effect on haemoglobin values was variable. Appetite, and with it milk yield, was consistently reduced and improved immediately on treatment. There was no clear effect of the deficiency on fertility. Seventeen cows were treated with 0.3 to 0.5 g. copper sulphate in 500 ml. 5 per cent. glucose solution, intravenously, resulting in immediate return of appetite and cessation of diarrhoea. In sheep in the area swayback was successfully prevented in large control groups by 1 g. copper sulphate *per os* 3 times during pregnancy.

H. B.

Pantothenic Acid Deficiency in Pigs (translated title). SCHULZE, W. (1960). *Dtsch. tierärztl. Wschr.* **67.** 245.

A report is given of several cases of pantothenic acid deficiency in pigs which showed the characteristic "goose-stepping" action of the hind limbs. Other symptoms reported have been poor growth, inappetence, lachrymation, dermatitis, diarrhoea, and nervous signs. The spastic movements of the hind quarters are notable. Deficiency is induced by many methods of feeding, notably when the animals are given principally grain and soya bean meal. Conversely, good sources of the vitamin are fish meal, liver, dried milk, brewers grains, etc. Treatment is by multiple doses of 500 to 750 mg. pantothenic acid.

A. D. W.

ACCESSIONS TO THE R.C.V.S. LIBRARY

Stanley-Jones, D. and K., The kybernetics of natural systems. 1960. Kon, S. K. and Cowrie, A. T., Milk: the mammary gland and its secretion. **1** and **2.** 1961. Peck, W. D., Pig keeping. 1960. Bouvier, G. *et al.*, Monographie des maladies du lievre en Suisse. 1954. Stead, G., Elementary physics. 10th ed. 1961. CIBA Foundation Symposium on congenital malformations. 1960. Dispensatory of the U.S.A. **2**, New Drug Developments. 1960. Ary, S., and Gregory, M., The Oxford Book of Wild Flowers. 1960. Modern Drug Encyclopedia and Therapeutic Index. 8th ed. 1961. B.V.A. Aspects of Skin Disease of the Dog and Cat. 1961. Medawar, P. B., The Future of Man. 1960. UNESCO, Vacations abroad. 1960. Perry, E. J., *ed.*, The Artificial Insemination of Farm Animals. 1960. Smith I. *ed.*, Chromatographic and Electrophoretic Techniques. 1960. British Association, The Complete Scientist. 1961. Schacter, M., Polypeptides which Affect Smooth Muscles. 1960. Standard Methods of Clinical Chemistry. **3.** 1961. Stern, C., Principles of Human Genetics. 2nd. ed. 1960. Roberts, F., Good English for Medical Writers. 1960. Thenius, E., and Hofer, H., Stammesgeschichte der Saugetiere. 1960. Arey, L. B., Developmental Anatomy. 6th ed. 1959. Mercer, E. H., and Birbeck, M. S. C., Electron Microscopy: a Handbook for Biologists. 1961. Yoffey, J. M., Quantitative Cellular Haematology. 1960. Thorpe, W. H., and Zangwill, O. L., Current Problems in Animal Behaviour. 1961. Keating, V., Anaesthetic Accidents. 2nd ed. 1961. Szent-Gyorgyi, A., Introduction to a Sub-Molecular Biology. 1960. Biological Stain Commission, Staining procedures. 1960. Nash, T. A. M., Tsetse Flies in British West Africa. 1941. Yockey, H. P., *ed.*, Symposium on Information Theory in Biology. 1958. Pitt-Rivers, R., and Tata, J. R., The Chemistry of Thyroid Diseases. 1960. Thorek, M., Surgical Errors and Safeguards. 5th ed. 1960. Laitha, L. G., The Use of Isotopes in Haematology. 1961. Field, J., *ed.*, Handbook of Physiology. Section 1. Neurophysiology. **3.** 1960. Wakely, Sir. C., *ed.*, Modern Treatment Yearbook. 1961. Farr, A. D., A Laboratory Handbook of Blood Transfusion Techniques. 1961. Chargaff, E., and Davidson, J. N., *eds.*, The Nucleic Acids. **3.** 1960. Sunderman, F. W., and F. W., jr. *eds.*, Lipids and the Steroid Hormones in Clinical Medicine. 1960. White, A., *et al.*, Principles of Biochemistry. 2nd ed. 1959. Peters, J. A., *ed.*, Classic Papers in Genetics. 1959. Bold, H. C., The Plant Kingdom. 1960. Illingworth, C. F. W., and Dick, B. M., A Textbook of Surgical Pathology. 8th ed. 1960. Duerst, J. U., Vergleichende Untersuchungmethoden am Skelett bei Saugern. 1926. Hadorn, E., Developmental Genetics and Lethal Factors. 1961. Lewis, E., Digestive Physiology and Nutrition of the Ruminant. 1961. Prankerd, T. A. J., The Red Cell. 1961. Best, C. H., and Taylor, N. B., The Physiological Basis of Medical Practice. 7th ed. 1961. Simpson, G. G., The Principles of Classification and a Classification of Mammals. 1945. Bergeijk, W. A. van, *et al.*, Waves and the Ear. 1961. Abbatt, J. D., *et al.*, Protection Against Radiation. 1961. Boyd, J. D., *et al.*, *eds.*, Electron Microscopy in Anatomy. 1961. Gardner, L. I., *ed.*, Molecular Genetics and Human Disease. 1961. Charnley, G., The Closed Treatment of Common Fractures. 3rd ed. 1961. Ellis, G. P., and West, G. B., Progress in Medicinal Chemistry. **1.** 1961. Darlington, C. D., and La Cour, L. F., The Handling of Chromosomes. 3rd ed. 1960. Frankling, E., Practical Dog Breeding and Genetics. 1961.

Divisional News

THE SOCIETY OF WOMEN VETERINARY SURGEONS

The spring meeting of the Society of Women Veterinary Surgeons was held at the School of Veterinary Medicine, Cambridge, on March 23rd, 1961, at 12,15 p.m. Miss Tillemont Thomason presided. Eighteen members and 4 visitors attended.

Apologies and good wishes for the meeting were received from Professor McCunn, Miss Appleby, Miss Morton, Miss Uvarov, Miss Biggs, Mrs. Bullard and Mrs. Lewis. Apologies were also received from Miss Delby, Mrs. Clarke, Mrs. Steward, Mrs. Bateman, Mrs. Cotchin, Miss Osborn, Mrs. Johnson, Mrs. Eden, Miss Wilson and Mrs. Seymour Smith.

The minutes having been circulated, were taken as read, confirmed and signed by the President. Miss Egginton reported that finances were satisfactory.

It was reported from Council that Mrs. Eden had suggested that the custom of holding the A.G.M. in London should be altered. Council recommended that the London meeting should take place in the autumn and the A.G.M. (necessarily at the end of May) in the country.

It was proposed by Miss Joshua, seconded by Miss Freak and agreed, that this alteration should be tried in 1962/63.

Autumn Meeting, 1961. Mrs. Kelly proposed, Mrs. Cole Powney seconded, and it was agreed that the Society should visit Liverpool.

In the afternoon, Dr. Lamont showed and commented on his film on the work that had been done at Cambridge on the production of pathogen-free piglets.

Dr. Walker gave a talk on diagnosis of surgical conditions in the thorax of the dog, illustrated by his own well-chosen slides.

Dr. Lamont then gave a report on his investigations into the disease of foxes which appeared in the Midlands last year. From his latest results, it would seem that a virus is involved.

Lively discussion ensued on all three subjects, in which Mr. Tom Bowden from the Animal Health Trust, Kennett, joined.

Miss Brancker proposed a vote of thanks to the speakers and to Dr. Storie Pugh and Mr. Carleston who had helped to make the arrangements for the meeting; this was carried with acclamation.

After tea members were shown the laboratories, operating rooms and kennels, and admired the equipment and the work which was being carried out.

NORTH OF IRELAND VETERINARY ASSOCIATION

This Association held a dinner in Belfast on April 21st to celebrate the success of the attestation scheme which was achieved last November. Nearly 100 members and their guests were present, and among the guests of honour were Mr. Sydney Jennings (President of the B.V.A.) and Mr. L. Guy Anderson (President-elect of the Royal College). The dinner was held in the Grand Central Hotel, Belfast.

The toast to Agriculture was proposed by Mr. Jennings, the reply being made by the Rt. Hon. H. W. West, Esq., M.P., Minister of Agriculture, Northern Ireland. The toast of the North of Ireland Veterinary Association (with which was coupled the

(*Concluded at foot of col. 1 overleaf*)

Our photograph shows, left to right, Mr. L. Guy Anderson (President-elect of the R.C.V.S.), Mr. P. Harmett (C.V.O., Eire), Mr. H. W. West, Mr. E. Conn, Mr. Sydney Jennings (President of the B.V.A.), Mr. W. H. Long and Professor H. G. Lamont.

News and Comment

ROYAL SOCIETY OF HEALTH CONGRESS

Another highly successful meeting of the Veterinary Hygiene Section was held in the Pavilion, Winter Gardens, Blackpool, on Wednesday, April 26th, in connexion with the Annual Congress of the Royal Society of Health.

Some 550 delegates representing all branches of public health were in attendance; the number of veterinary surgeons present was the highest yet recorded and emphasised the increasing interest taken by the profession in matters connected with public health. Another pleasing feature from the organisers' point of view was the number of delegates taking part in the discussions.

The section met under the Presidency of Mr. E. R. Callender, O.B.E., who, in his Presidential Address, emphasised the importance of the veterinarian in public health affairs and the excellent opportunity the Veterinary Hygiene Section afforded for discussing with members of the medical profession, public health officers and others who share a common interest in matters concerning the health of the public generally, veterinary problems which have a bearing on public health. Lt.-Col. J. A. Dixon, of Southport, a vice-President of the Section and a member of Council of the Royal Society of Health, for many years, admirably proposed a vote of thanks to the President for his excellent Address.

The first paper of the session was given by Mr. S. Jennings, President of the British Veterinary Association, who dealt with "Hormones and their Effect on Meat and Meat Production" and illustrated his talk with some excellent colour transparencies. Dr. G. H. Arthur, of the Royal Veterinary College, formally opened the discussion on this paper and also showed colour slides illustrating the effects which hormones have on carcase quality.

Speakers who took part in the general discussion, raised many interesting points including the possible effects that the extensive use of hormones in stimulating animal growth might have on the subsequent health of the public eating the flesh of such treated animals.

The second paper, "The Changing Emphasis in Meat Inspection" was also of the high quality now expected from Mr. R. V. Blamire, Deputy Chief Technical Adviser, Ministry of Agriculture, Fisheries & Food. The discussion on this paper was opened by Mr. E. P. Lawton, Chief Veterinary Officer, Manchester Corporation, and followed by many speakers endorsing Mr. Blamire's contention that the decline of tuberculosis inevitably means that more emphasis will be placed on those conditions which present less obvious evidence to the Inspector and which will require a rather more comprehensive approach than has been thought necessary up to now. This will entail a greater use of laboratory aids and those laboratory services which are already available.

Preceding the Veterinary Hygiene meeting, the Association of Veterinary Food Hygienists met at the Cliffs Hotel, Blackpool, under the chairmanship of Mr. H. Thornton, of Newcastle on Tyne, and the following topics were discussed. Avian Tuberculosis in Pigs and Tuberculosis in Poultry, by H. Thornton. Slaughterhouse Hygiene, by A. Spreull, Dundee, and D. Allan, Liverpool University. *Cysticercus bovis* and Trichiniasis, by C. G. Allen, Birmingham, and Warbles, by W. Tweed, of Chester.

Following this meeting a very successful luncheon, organised by the Lancashire Division of the B.V.A. was held in the Winter Gardens, Blackpool, for those veterinary surgeons attending the Health Congress. Thirty members of the profession attended and Dr. J. C. Greatorex, secretary of the Veterinary Hygiene Section expressed on behalf of those present his appreciation to the Lancashire Division and particularly to Mr. P. E. Curtis their secretary for arranging a very enjoyable gathering.

VETERINARY PHOTOGRAPHY AND CINEMATOGRAPHY AT CONGRESS

A meeting will be held at the Congress for those who are interested in the various aspects of veterinary photography and cinematography. Slides and films will be shown and if the meeting is sufficiently well supported a small committee will be formed as the first step in developing a veterinary photographic association.

An exhibition of photographic material will also be held. Support for this project is requested from all branches of the profession. Exhibits will be grouped in three sections:—

(a) 2 inch × 2 inch transparencies (colour or monochrome).
(b) Films. Both 8 and 16 mm. film will be accepted.
(c) Mounted prints. The B.V.A. has allocated a stand for this section and it is hoped that offers of exhibits will be numerous.

A guide for the preparation of exhibits is being prepared and may be obtained shortly from the organiser, Mr. P. R. Greenough, "Avalon House," Castle Cary, Somerset, or the exhibition secretary, Mr. K. C. Barnett, The Royal Veterinary College, Camden Town, London, N.W.1.

Divisional News.—*Concluded.*

Royal College of Veterinary Surgeons) was proposed by Mr. W. H. Long, C.B., Permanent Secretary, Ministry of Agriculture, Northern Ireland and replies were by Mr. E. Conn, M.R.C.V.S., President of the North of Ireland Veterinary Association and Mr. L. Guy Anderson. The Guests were proposed by Professor H. G. Lamont, replies being made by Mr. H. J. Cromie, President of the Ulster Farmers' Union, Dr. J. A. L. Johnston, M.D., President of the Ulster Medical Society, and Mr. P. J. Daly, President of the Veterinary Association of Ireland. The whole evening was a very great success, and one of the happiest occasions in the annals of the Association.

R.C.V.S. HONOURS AND AWARDS

The Council of the Royal College has approved recommendations of the names of recipients of the following honours and awards.

The John Henry Steel Memorial Medal

William Fleming Hoggan Jarrett, Esq., PH.D., M.R.C.V.S., and William Rowan Kerr, Esq., I.S.O., D.SC., PH.D., M.R.C.V.S., D.V.S.M.,

The Livesey Medal

Sydney Jennings, Esq., M.R.C.V.S., and Miss Barbara M. Q. Weaver, M.R.C.V.S.

The Francis Hogg Prize

Somerset Frederick John Hodgman, Esq., M.R.C.V.S., and Donald Douglas Lawson, Esq., M.R.C.V.S.

The R. W. Hall, of Barry, Glamorgan, Prize

John Beveridge White, Esq., M.R.C.V.S.

The Share-Jones Lectureship

Professor Christopher Wyndham Ottaway, F.R.C.V.S., PH.D., as Share-Jones Lecturer for 1961. The subject proposed is, "The anatomy of motion."

J. T. Edwards Memorial Fund

Silver medal to Hubert Henry Skinner, Esq., M.R.C.V.S.

THE BRX CLUB

On April 8th the BRX Club once again met at the Royal Veterinary College to engage in discussion during the assembly and over the dinner table. The President, Professor C. W. Ottaway, in a short speech referred to the solidity of the Club and the enthusiasm with which he had received letters from members abroad. The Club was then addressed by the guest of honour, Professor R. Lovell, who referred to the intrinsic value of meetings such as this and how much they could mean to members. In a most amusing speech J. W. H. Brooks thanked Professor Lovell and referred to first meeting him as treasurer of the Students' Union at Streatley. This occasion, he said, was the first time both "leaders" of war-time companies were present at a Club dinner, although one was perhaps inhibited by the presence of his wife. The Club was then addressed by Mrs. "Oscar" who recalled that the only other occasion she had spoken publicly to Club members was during the war when she raffled a scarf in R.V.C. colours in aid of the V.V.B.F.; it had been won by the late Professor Wooldridge.

HOLIDAY EXCHANGES

Italy

Professor Mantovani, of Teramo, central Italy, would like to arrange an exchange holiday of one month's duration for his 14-year-old son. The family live close to the seaside and near to the area of permanent snow. Professor Mantovani would prefer to contact a veterinary surgeon in the London area or in the south of England. For further information readers should write direct to Professor Dr. A. Mantovani, Associazione Italiana Veterinari per Piccoli Animali, Istituto Zooprofilattico, Teramo, Italy.

Norway

Dr. Leif Holte, a district veterinarian living near Oslo, would like to contact an English veterinary surgeon to arrange an exchange holiday for his 16-year-old daughter. She is anxious to visit England in the summer, and the family would entertain an English girl in Norway either this year or next. Dr. Holte's address is Nannestad, Norway.

UNIVERSITY NEWS

Bristol

Third examination for the degree of B.V.Sc.
April, 1961

(Pathology, Parasitology and Animal Husbandry II)

The following candidates were successful:—

Baker, G. J. (Distinction in Veterinary Pathology and in Parasitology); Dunford, S. J.; Fagg, R. H.; Foster, S. J.; Garratt, R. C.; Griffin, R. B.; Kelly, A. M.; Sharpe, W.; Spiers, R. C.; Stephens, D. B. (Distinction in Animal Husbandry II); Stephens, D. E.; Taylor, Miss J. K.; and Wilsmore, A. J.

THE JOHN MURDOCH TRUST

It has been suggested that we should draw the attention of older members of the profession to this Trust. It exists to provide donations or pensions to bachelors or widows who may be in need, and who have practised science in any of its branches. The gifts are made from year to year only, and may be increased, reduced or withdrawn at the discretion of the trustees. Application forms for assistance under the Trust are available from Messrs. Shepherd & Wedderburn, W. S., 16, Charlotte Square, Edinburgh.

MAJOR J. G. McGREGOR

Mr. Alex. Thomson writes:—

The funeral of Major J. G. McGregor took place at Woodside Crematorium, Paisley, on Friday, April 28th, attended by many friends. Members of the profession present included M. H. W. Miller (representing the Ministry of Agriculture), A. S. Chapman (President of the West of Scotland Division), R. E. McGrath, Alex. Thomson, J. McQuaker, and Andrew Sillars.

In the passing of Major J. G. McGregor, T.D., the profession has severed another link with that generation of men who played their part in upholding the ideals of progress in preventive medicine. Qualifying at the "Dick" in 1907 he undertook general practice, served in the R.A.V.C. during the 1914-18 War, and as assistant in the County of Lanark under the late Hugh Begg. He developed his interest in the eradication of TB in the expansion of the County Veterinary Services which took place in the thirties. He became C.V.O. for Stirling where he quickly became a forceful and kindly kenspeckle figure. Always keenly interested in the profession, he served on the Council of the N.V.M.A. and of the Scottish Branch.

As an active member of the West of Scotland Division, it was as the result of his efforts that the scheme for the eradication of tuberculosis finally formalised by the Scottish Branch came into being in 1925; and it was a great source of pleasure to him to have seen the completion of attestation.

I have been fortunate in having had the privilege of his friendship and advice over the years since my first Congress at Folkestone in 1929, when he and his wife, and his friend John McFarlane, of Doune, ensured that an inexperienced youngster was truly imbued with the Congress habit.

The sympathy of all his friends goes out at this time to his widow.

THE REGISTER OF VETERINARY SURGEONS

The under-mentioned gentlemen were registered in the Commonwealth List on the dates shown:—

HOFMEYR. Christiaan Frederick Beyers, B.V.SC. (PRETORIA). Dept. of Surgery, Faculty of Veterinary Science of the University of Pretoria, P.O. Onderstepoort, Pretoria, South Africa. April 21st, 1961.

MAYNE, Francis George, B.V.SC. (SYDNEY), c/o Overseas Visitors Club, 180 Earls Court Road, London, S.W.5. April 27th, 1961.

7th INTERNATIONAL CONGRESS OF BIOLOGICAL STANDARDISATION

With reference to the above Congress, to be held in London from August 28th to September 1st, the address of the meeting place has now been changed from Church House, Great Smith Street, Westminster, to The Wellcome Foundation Ltd., The Wellcome Building, Euston Road, London, N.W.1.

R.C.V.S. OBITUARY

We record with regret the death of the following members of the profession:—

HICKS, Thomas, of Sleaford, Lincolnshire. Graduated Royal Veterinary College, London, July 14th, 1905. Died April 10th, 1961, aged 81 years.

HOLLAND, Charles, *M.C.*, D.T.V.M., 32 Old Church Road, Droitwich, Worcs. Colonel, R.A.V.C. (Retd.). Graduated from the Royal Veterinary College, London, February 25th, 1912. Died May 3rd, 1961, aged 70.

SPICER, Arnold, Crabwood, Oxted, Surrey. Graduated from the Royal Veterinary College, London, December 13th, 1899. Fellow of the R.C.V.S., December 13th, 1904. Council Member of the R.C.V.S., 1935-49, and Vice-President of the Royal College 1946-47. Died April 25th, 1961, in his 87th year. A notice published in *The Times* read: Cremation private: no flowers or letters please.

MCGREGOR, Josiah Gillray, *T.D.*, 32 Main Road, Castlehead, Paisley, Renfrewshire. Major, late R.A.V.C. (T.A.). Graduated from the Royal (Dick) School of Veterinary Studies, May 22nd, 1907. Died, April 26th, 1961, aged 75 years.

R.C.V.S. COUNCIL ELECTION, JUNE, 1961

The Registrar wishes to remind members who have not yet returned their completed voting papers that these should be despatched to arrive at his office on or before May 29th, 1961.

ERRATUM

It is regretted that owing to an error in our reporter's transcript of the Proceedings of R.C.V.S. Council, remarks made by Professor Lovell were wrongly attributed to Professor Buckley. There is, of course, no Professor Buckley on the Council.

PERSONAL

Dr. W. M. McKay, of Cyanamid, has been appointed regional co-ordinator for Western Europe in the company's International Agricultural Division.

Births

AMOR.—On April 28th, 1961, to Jill (*née* Nalder), wife of Oliver Amor, B.A., VET.M.B., M.R.C.V.S., a daughter, Joanna Mary.

DIXON.—On May 1st, 1961, to Joan B. Dixon, B.V.SC., PH.D., M.R.C.V.S. (*née* Hopwood) and Marcus E. Dixon, 57A, Scarisbrick New Road, Southport, a son, Alistair Roy.

JACKSON.—On April 11th, 1961, to Elizabeth and Oliphant Jackson, MS.R.C.V.S., of P.O. Box 2080 Ndola, Northern Rhodesia, a son, Anthony Oliphant, a brother for Rosemary and James.

PALMER.—On May 4th, 1961, to Shirley, wife of Tony Palmer, at the Maternity Hospital, Mill Road, Cambridge, a son, brother for Mark.

POTT.—On May 7th, 1961, to Margaret, wife of John Malcolm Pott, B.V.M.S., M.R.C.V.S., 27, Whitfield Avenue, Pickering, N. Yorks., a daughter, Alison Louise.

SNOW.—On April 25th, 1961, to Ann and Keith, of Winchcombe, Gloucestershire, a daughter, Hilary Clare, sister for Adrian.

Marriage

TRIBE—TAYLOR.—On Saturday, April 15th, 1961, at St. Stephen's Church, Manor Park, London, E.12, Howard Arthur Tribe, B.VET.MED., M.R.C.V.S., of Romford Road, Manor Park, to Angela Eveline Taylor, of First Avenue, Manor Park.

Diamond Wedding

Lieut.-Col. and Mrs. H. G. Bowes celebrated their Diamond Wedding on April 19th. Col. Bowes, a Fellow of the Royal College qualified in 1893.

COMING EVENTS

May

17th (Wed.). CORNWALL VETERINARY CLINICAL CLUB. Meeting at the Red Lion Hotel, Truro, 7.30 p.m.

SOUTHERN COUNTIES VETERINARY SOCIETY. Annual General Meeting at the Red Lion Hotel, Salisbury, 5.30 p.m.

18th (Thurs.). SUPPLEMENTARY VETERINARY REGISTER DIVISION. Council Meeting at 7 Mansfield Street, Portland Place, London, W.1, 2 p.m. followed by the Annual General Meeting at 2.30 p.m.

B.S.A.V.A. MIDLAND REGION. Annual General Meeting at the Queen's Hotel, Birmingham, 2.30 p.m.

B.S.A.V.A. SOUTH EASTERN REGION (4). Annual General Meeting at the Royal Mount Ephraim Hotel, Tunbridge Wells, at 8 p.m.

24th (Wed.). SOCIETY OF PRACTISING VETERINARY SURGEONS. Annual General Meeting at the Randolph Hotel, Oxford, 2.30 p.m.

25th (Thurs.). MIDLAND COUNTIES VETERINARY ASSOCIATION. Annual Dinner at the Penny Hall Hotel, Sutton Coldfield.

WESTERN COUNTIES VETERINARY ASSOCIATION. A meeting at the Hotel Victoria, Newquay, Cornwall, at 2.30 p.m.

WEST OF SCOTLAND DIVISION. Annual General Meeting at the Veterinary Hospital, Garscube Estate, Bearsden, 7.30 p.m.

SOCIETY OF WOMEN VETERINARY SURGEONS. Annual General Meeting at the Field Station, Royal Veterinary College, Hawkeshead House, North Mimms, 2. p.m.

ESSEX VETERINARY SOCIETY. Annual General Meeting in the Committee Room of the M.A.F.F. Offices, Beeches Road, Chelmsford, 7.30 p.m.

MIDLAND COUNTIES VETERINARY ASSOCIATION. Annual Dinner at the Penny Hull Hotel, Sutton Coldfield, 9 p.m.

26th (Fri.). R.V.C. STUDENTS' UNION SOCIETY. Annual Ball at the Park Lane, Hotel, Piccadilly, 8 p.m.

27th (Sat.). CHIRON CLUB. Annual Reunion Dinner-Dance at the Grand Atlantic Hotel, Weston-super-Mare.

B.S.A.V.A. SOUTHERN COUNTIES (Region 6). Annual General Meeting at the Royal Hotel, Winchester, at 7 p.m.

29th (Mon.). EAST YORKSHIRE CLINICAL CLUB. Meeting at the Talbot Hotel, Malton, 8 p.m.

30th (Tues.). SOCIETY FOR THE STUDY OF ANIMAL BREEDING. Meeting at the Royal Society of Medicine, 1 Wimpole Street, London, W.1, 11.30 a.m.

VICTORIA VETERINARY BENEVOLENT FUND. Annual General Meeting at the Royal Veterinary College, Royal College Street, Camden Town, London, N.W.1, 2.30 p.m.

June

9th (Fri.). R.A.V.C. OFFICERS' CLUB. Annual Dinner at the Naval and Military Club, 94 Piccadilly, W.1.

10th (Sat.). R.V.C. 1952 Club's Annual Reunion. Dinner at "Ye Miller of Mansfield," Goring-on-Thames.

17th (Sat.). B.S.A.V.A. NORTH-WEST REGION. Meeting at the Queen Hotel, Chester, 7.30 p.m.

September

3rd to 9th (Sun. to Sat.). 79th Annual Congress of the British Veterinary Association at Oxford.

7th (Thurs.). ROYAL VETERINARY COLLEGE ASSOCIATION. Annual Dinner during the B.V.A. Congress at St. Edmund's Hall, Oxford.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Fowl Pest

Lincs. Naylors Farm, Campney Lane, Bucknall (May 2); Campney Grange Farm, Bucknall (May 3); 120 Spalding Road, Holbeach, Spalding (May 4).
Oxford. Tadmarton House, Bloxham, Banbury (May 2).
Yorks. Brookhouse Farm, Middleton Tyas, Richmond (May 4).

Swine Fever

Cambs. Peacocks Lane, Cottenham Road, Histon (May 2).
Carms. Talyclun Farm, Llangennech, Llanelly (May 3).
Glam. The First, Waunarllwydd, Swansea (May 2).
Staffs. Common Barn, Farm, Hints, Tamworth (May 4).
Yorks. South View, Main Road, Gilberduke, Brough (May 2); Church Farm, Hilston, Withernsea (May 3); Willow Tree Farm, West Rounton, Northallerton (May 4).

IMPORTATION OF DANISH RED CATTLE

The Red Poll Cattle Society of Great Britain and Ireland has made a proposal to import a number of Danish Red cattle from Denmark to improve the milking characteristics of the breed.

The Secretary of State for Scotland and the Minister of Agriculture, Fisheries and Food have, subject to strict veterinary control, approved the proposed importation under Section 27 of the Diseases of Animals Act, 1950, which empowers the Ministers to authorise the importation of cattle from abroad for special purposes. An order will be necessary under the Act; this will be made when final details have been agreed by the Agricultural Departments.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN
Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th April, 1961		7	—	3	39	—	49
Corresponding period in	1960	11	—	—	104	—	33
	1959	20	—	—	42	—	49
	1958	3	1	8	28	—	43
1st January to 15th April, 1961		75	—	101	491	—	349
Corresponding period in	1960	90	—	10	986	—	318
	1959	83	—	1	260	—	337
	1958	55	3	108	223	—	311

TUBERCULOSIS ORDER OF 1938

The number of bovine animals slaughtered under the Tuberculosis Order of 1938 during the period 1st January to 31st March 1961, was 2.

FOOT-AND-MOUTH DISEASE—FINAL FIGURE FOR 1960

The number of animals slaughtered as diseased or exposed to infection during 1960 was 70,593.

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

GENERAL

Mr. Howel V. Hughes

Sir,—Mr. Howel V. Hughes, Reader in Veterinary Anatomy, will be retiring at the end of this session after 41 years service as a teacher in this School. It is proposed to mark the occasion by making a presentation to him, and present members of the staff feel sure that there are many graduates of the Liverpool School who would wish to be associated with such a presentation. I shall be grateful if you, Sir, will make this known through the medium of your columns. Donations will be gladly received by the undersigned, and arrangements regarding the presentation ceremony will be notified later to those who have contributed.

Yours faithfully,
J. G. WRIGHT,
Dean.

Faculty of Veterinary Science,
University of Liverpool,
Veterinary Field Station,
Leahurst,
Neston,
Wirral,
Cheshire.

May 9th, 1961.

The Future of Animal Husbandry in Overseas Territories

Sir,—Mr. Arnold's letter of April 15th contains many truths but I must beg to differ from him on one cardinal issue. I cannot agree that tropical veterinary science can properly be taught in a non-tropical country.

My reasons for differing derive from two personal convictions born of some considerable teaching experience. Firstly, it is my confirmed belief that students cannot learn an applied biological science from lectures alone, and, secondly, that teachers cannot teach a live subject such as this from books alone.

If Mr. Arnold's proposals were accepted, students of tropical veterinary science in Europe would never see (at instructional level at least) such diseases as rinderpest and heartwater, or, indeed, a high proportion of the conditions with which they would be expected to be familiar. To appreciate such diseases clinical students simply must see and handle them before and after death within the context of the husbandry in which they arose, and paraclinical students must have visual demonstration of unpreserved pathological specimens.

Similarly, if lecturers are not to offer sterile recitations from texts, they must live (either through on-the-spot research or practice) amongst the problems they are teaching. Under Mr. Arnold's system, it might well be that within a decade or so his teachers of "tropical" veterinary science would have never seen a single viable example of tropical disease or husbandry, or, indeed, have ever set foot in the tropics. In less than 20 years the course would be as dead as the dodo.

Beyond this it is as unthinkable that Africa south of the Sahara should be without veterinary schools open to all races, as it would be for, say Australia to be so situated.

Mr. Arnold's fears for future standards overseas may indeed be well founded, but, if the emergent states have not the inner conviction required to maintain veterinary standards within their countries, then the mere training of staff in a sterile discipline overseas will hardly affect the issue for on their return they will be swamped by the attitude of the public and profession alike. On the contrary, the greatest hope of maintaining standards is to leave these peoples with viable traditions deeply imbued in the classrooms of self-owned veterinary schools of which they can be proud, in the self-regulating associations to which they graduate right through to the topmost ranks of the service. If the departing expatriates can achieve this they will have done all they humanly can do and the rest is up to their successors. Such an achievement can only be brought about by an early complete acceptance of local men as fully responsible persons derived from locally rooted traditional institutions.

Yours faithfully,
J. B. POLDING,
Dean of the Faculty.

Makerere College,
Faculty of Veterinary Science,
P.O. Kabete,
Kenya.

May 5th, 1961.

The Future of the Profession

Sir,—I do not believe in introducing politics, as others have done, into our profession, but unfortunately terms such as "nationalisation" are nearly always attributed to one sphere or other of the political field. Nevertheless, with regard to nationalisation, it must be evident on common-sense grounds alone that an individual must be irresponsible, or else thinking only of self-gain, who would willingly vote for the nationalisation of our profession. Its result would be to push this poor, over-burdened country into yet further depths of taxation, and plague fellow practitioners with the lack of incentive and lack of remuneration, which are typical of the medical profession to-day—as admitted and regretted by many of its members.

In my view the costs of running a nationalised veterinary service could roughly be represented by halving the costs of the average Ministry of Agriculture Veterinary Investigation Centre and then multiplying this figure by the number of practices in the British Isles.

It is certain that any nationalised practice would

cost several times the amount of money to run than the same type of private practice would, especially as it would have to bear its share of general administration costs.

Do we really want to inflict such a burden on the tax-payer to maintain a nationalised veterinary service for the already grossly over-subsidised British farmer—who, no doubt, will not be expected to pay a penny towards the costs?

It is bunkum to say that we cannot provide an efficient service as we are. If we are in need of sample analysis or special advice we already have our area veterinary investigation centres, who serve us well. On the small-animal side general laboratories provide an efficient service, and even if some of us may not have our own X-ray machines this service can be obtained locally in most cases.

I think our profession, in spite of one or two thorns in its side, is not doing too badly, or providing anything other than a fully adequate service.

The "thorns" to which I refer are mainly represented by the apparent lack of initiative of those bodies which govern our profession and are supposed to safeguard its rights. They have also a moral obligation to see that sick animals are treated only by those who are properly qualified.

It will, therefore, be something of a shock to many of us to realise, from last week's VETERINARY RECORD that welfare clinic licensees are to be elevated to the Supplementary Register*.

It is not my intention here to criticise licensees or members on the Supplementary Register, but merely to point out that neither of these groups has ever had to pass an examination to ascertain how capable its individuals may be of treating animals, and, in the case of the latter group, of carrying out operations. Some of these gentlemen may be excellent, others quite the opposite; how are we to know which is which?

We private practitioners, and I hope many are in agreement with me are extremely disappointed that the R.C.V.S. and the B.V.A. have even yet not found a way of ensuring that a large portion of our livelihood is not taken from us by welfare societies treating the animals of rich and poor alike.

To place licensees on the Supplementary Register will only aggravate the situation, since they will automatically have their scope widened. I, for one, say that this action must not be taken speedily, as certain bodies are hoping, but that divisional B.V.A. meetings must firstly be held, and opinion taken on the subject.

Yours faithfully,

R. HODDINOTT.

Mill Pond House,
Hayle,
Cornwall.
May 8th, 1961.

* Our correspondent is premature. The first three paragraphs of the R.C.V.S. Council Meeting (*Vet. Rec.* **73**. 445, col. 2) state that the altered status of licensees has only been *discussed*, and that the B.V.A. is to be consulted.

Administering Medicine to Small Birds

Sir,—In his recent letter Mr. Oliver Graham-Jones has referred to the problems involved in administering medicaments to small cage-birds and has described a commercial product in which these have been largely overcome. Members of the profession will, however, be aware that some 2 years ago we described a new product* based on the dehusked seeds of *Setaria italica* and having a high degree of acceptance to budgerigars and other small birds. The vehicle was chosen from the results of extensive studies on the feeding habits of these birds and their acceptance of a wide range of materials. This study provided valuable information on the feeding habits of the budgerigar which will be published shortly. Mr. Graham-Jones has described a different species of seed, treated intact, but there would, otherwise, appear to be no new principle involved.

There has, therefore, been in existence for some time, a method of administering nutrient materials to budgerigars and other small cage-birds. The technique involved could doubtless be used in connexion with a variety of medicinal substances.

Yours faithfully,

E. H. B. SELLWOOD,
Chief Chemist.

Bob Martin Ltd.,
Southport.
May 9th, 1961.

References

GRAHAM-JONES, O. (1961). *Vet. Rec.* **73**. 331.
HUTCHESON, LILLIAN M., BOOKER, KATHLEEN M., & WATERHOUSE, C. E. (1961). *J. Small Animal Pract.* In press.
VETERINARY DIVISION, BOB MARTIN LTD. (1959). "Some Notes on the Nutrition of the Budgerigar."

* Gaylets.

SCIENTIFIC

The Immunising Efficiency of Canine Distemper Virus Grown in Tissue Culture

Sir,—Those concerned with the production and evaluation of living attenuated canine distemper vaccines will have noted with interest the published findings of several groups of workers using virus propagated in tissue cultures instead of in fertile eggs. Cabasso, Kiser and Stebbins (1959), for example, report that ferrets were immunised with less than one EID_{50} of chick embryo tissue culture virus. York, Bittle, Burch and Jones (1960), also using chick embryo tissue culture virus, state that only 1 to 8 EID_{50} were needed to immunise dogs, and Sinha, Stewart, Marshall, Haas and Hawksley (1960), using virus grown in dog kidney tissue cultures, estimate that dogs are protected with 10 EID_{50} or less. Cabasso and his colleagues suggest that their results can be explained by the relatively high sensitivity of the ferret which can detect minute amounts of virus, whereas the chorioallantoic membrane of the fertile egg "fails to reveal the entire virus content of infected preparations." The other 2 groups emphasise that whereas virus grown in eggs may be partially bound by foreign protein, tissue culture

virus is relatively free from this encumbrance and may, therefore, multiply more easily in the inoculated animal.

A further finding of York and his colleagues was that remarkably high antibody levels, reaching $10^6 SN_{50}$ per 0.05 ml. serum in some cases, developed within 3 weeks of the injection of tissue culture distemper vaccine. Such levels were not, however, observed by Sinha's group in dogs given their own preparation.

These results infer that distemper virus grown in tissue culture is a more efficient immunising agent than virus grown in eggs, permitting a substantial reduction in the number of EID_{50} needed to protect dogs. Claims for the effectiveness of only 1 to 10 EID_{50} of tissue culture virus may be compared with estimates of 64 to 250 EID_{50} by Burgher, Baker, Sarkar, Marshall and Gillespie (1958) and 1,000 EID_{50} by Piercy and Sellers (1960). The greater amount considered necessary by the last-named can largely be explained by the high degree of attenuation of the strain of virus used, and by the more sensitive method of virus titration employed (Fitzgerald, 1953) which, in the writer's experience, regularly detects substantially more virus than Gorham's (1957) method used by the workers referred to. The real point of interest is that the American groups using tissue culture virus were able to immunise dogs and ferrets with significantly smaller doses than were their compatriots using egg propagated virus, although all used strains of virus at about the same level of attenuation and the same methods of virus titration.

Whatever may be the explanation, the results with tissue culture virus are important and command close attention. Research has been going on at these laboratories to see whether similar findings can be obtained with the Beckenham embryo-adapted strain of Onderstepoort distemper virus. It is believed that the results so far obtained are of sufficient significance to merit early publication.

Having adapted the strain to chick embryo tissue culture, and elaborated a suitable method of vaccine production, the immunising efficiency of tissue culture virus was compared with the original strain grown in eggs by inoculating serial dilutions of each into ferrets, which were challenged 3 weeks later with 1,000 M.L.D. of virulent distemper virus. Serum samples for serological analysis were obtained, just prior to challenge. The virus titres of the 2 vaccines were known and the results may, therefore, be expressed as the number of EID_{50} needed to confer a 50 per cent. protection (Table I).

There was no evidence that tissue culture vaccine was a more efficient immunising agent than egg vaccine, the 50 per cent. end-points being 7 and 9 EID_{50} respectively. The antibody responses of the 2 groups were of the same order.

A second trial in ferrets, carried out in the same way, gave the following values for 50 per cent. protection—tissue culture vaccine 13 EID_{50}; egg vaccine 25 EID_{50}.

A third trial in ferrets compared (a) a sample of freeze-dried tissue culture vaccine, prepared by mass production methods, with (b) stock Beckenham egg vaccine and (c) a sample of commercially produced tissue culture distemper vaccine now being marketed in another country. The 50 per cent. protection figures were (a) 25 EID_{50}, (b) 40 EID_{50} and (c) 32 EID_{50}.

TABLE I
IMMUNISATION OF FERRETS WITH DISTEMPER VACCINES

Tissue culture vaccine			Egg vaccine		
Dose (EID_{50})	SN_{50}* (Logs)	Challenge	Dose (EID_{50})	SN_{50}* (Logs)	Challenge
657	>4·3	I	15,750	>3·8	I
657	>3·8	I	15,750	>4·3	I
65·7	>4·3	I	1,575	3·0	I
65·7	>4·3	I	1,575	>4·3	I
6·57	2·5	?†	157·5	3·3	I
6·57	2·3	S	157·5	1·7	S
0·657	1·4	S	15·75	2·8	I
0·657	2·3	S	15·75	>4·3	I
50% protection—7 EID_{50}			50% protection—9 EID_{50}		

* Negative log reciprocals, 3 weeks' post vaccination.
I=Immune ; S=Susceptible.
3 Controls to challenge died 14th day p.i.
Titres calculated by the method of Reed and Muench (1938).
† Died during bleeding (immunity assumed).

Clearly, these results do not entirely conform with those reported by other workers and further research is desirable to explain the differences. Factors such as strain of virus, level of attenuation and titration techniques may have an important bearing. Furthermore, it cannot be assumed that dogs will respond in precisely the same way as ferrets. It is of interest, however, that in a preliminary trial in 6 dogs given tissue culture vaccine, the antibody responses failed to reach the high figures quoted by York *et al.* (1960). Doses varying from 1,259 to 125,900 EID_{50} were used and no dog developed an SN_{50} titre of more than 6,000 per 0.1 ml. serum when tested 4 weeks later.

Meanwhile, the results of other trials in dogs given tissue culture vaccine are being analysed and will be published in a further communication (Piercy & Sellers, 1961).

Yours faithfully,
S. E. PIERCY.

Wellcome Research Laboratories,
Langley Court,
Beckenham,
Kent.

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References

BURGHER, J. A., BAKER, J. A., SARKAR, S., MARSHALL, V., GILLESPIE, J. H. (1958). *Cornell Vet.* **48.** 214.
CABASSO, V. J., KISER, K., & STEBBINS, M. R. (1959). *Proc. Soc. exp. Biol. Med.* **100.** 551.
FITZGERALD, W. A. (1953). *Sci. Tech. Ass. Bull.* **3.** 4.
GORHAM, J. R. (1957). *Amer. J. vet. Res.*, **18.** 691.
PIERCY, S. E., & SELLERS, R. F. (1960). *Res. vet. Sci.* **1.** 84.
———, ———. (1961). Manuscript in preparation.
REED, L. J., & MUENCH, H. (1938). *Amer. J. Hyg.* **27.** 493.
SINHA, S. K., STEWART, G., MARSHALL, V., HAAS, H., & HAWKSLEY, M. (1960). *Vet. Med.*, **55.** 36.
YORK, C. J., BITTLE, J. L., BURCH, G. R., & JONES, D. E. (1960). *Ibid.* 30.